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CONTROL OF STAPHYLOCOCCAL INFECTIONS IN HOSPITALS*

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IN THE PAST FEW YEARS, authorities in hospital administration, surgeons, physicians and bacteriologists have been increasingly unanimous on the subject of the growing menace of antibiotic-resistant organisms creating endemic conditions in hospitals, and various facets of the problem have been examined in detail.

The current studies in hospitals of the Department of Veterans Affairs have been aimed mostly at staphylococcal infections. Because of the type of patient dealt with in these hospitals, the particular problems connected with obstetrical and paediatric practice have not been explored except by analogy.

The references appended have been selected because of their particular relevance to the problem of staphylococcal infections in hospital services devoted to the care of adults, but naturally most of the observations and recommendations apply to all types of hospital practice.

Conveyance of infection from patient to patient, from patient to attendants and vice versa, with the complications of transmission by dust in the air, depots in bedclothes and other inanimate carriers, are recognized as dangers as old as hospitals. To combat these problems, a multitude of aseptic, antiseptic and sterilization techniques have been built up over the years, techniques which should be constantly modified and improved to meet changing circumstances. While it has always been recognized that part of the basic training of everyone involved in hospital work must include training in methods for combating spread of infection, it has also been recognized that human frailties will always give rise to errors of omission or commission

unless a diligent watch is maintained. In the past, such errors had dramatic consequences in the form of uncontrollable, acute streptococcal infections, mixed puerperal infections, gas gangrene, etc., and the psychological impact of these made it comparatively easy for the authorities to re-establish rigid adherence to preventive systems or to introduce new methods when required. With better physical aids, hospital designs and, finally, the advent of effective chemotherapeutic and antibiotic agents, these erstwhile dramatic infections have been practically eliminated. In addition to these factors, it is obvious that a great many acute infections such as respiratory infections caused by hæmolytic streptococci are now treated successfully in their incipient stages at home and the sufferers do not bring such bacteria into the hospital environment.

Staphylococcal infections are exceptions. They have always been common, as far as can be determined (*Exodus* 9-8, *Job* 2-7). The vast majority of the lesions they produce are of a minor character—minor wound infections, paronychia, pimples, boils and relatively mild upper respiratory infections. Even the more serious, rarer types such as multiple boils, carbuncles, osteomyelitis and more severe respiratory infections are chiefly remarkable for their debilitating characteristics and, nowadays, for their stubborn resistance to treatment.

Dramatic and dangerous staphylococcal infections are, comparatively speaking, very rare and depend upon fortuitous combinations of circumstances, some of which are poorly understood. In general, it is known that for the production of a dangerous and dramatic staphylococcal infection, a sufficiently large dose of a sufficiently virulent strain must be introduced into particularly vital tissues of a person whose physical resistance is not of a high order. Alternatively, the required inoculum must occur at a site particularly favourable for bacterial growth such as tissue damaged by burning or trauma. In

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addition to the lack of drama connected with the vast majority of staphylococcal infections, we are faced with the problem of their propensity for developing resistance to antibiotic therapy. The natural consequences of these characteristics are that hospitals tend to admit infected cases with demonstrated resistance to usual antibiotic therapy prior to admission; further, such cases after admission do not give the impression of being "dangerous".

In considering present conditions and the immediate future, it seems probable that all hospitals will have to continue to admit patients with staphylococcal infections resistant to therapy. Because such patients are not in the earliest stages of infection and because their pre-hospitalization therapy has failed, they represent unfavourable cases for treatment in hospital and their stay is liable to be prolonged and difficult; meanwhile, they are contaminating their environment. As the hospital becomes contaminated from these sources, attending staff and other patients become actively infected or become carriers, with a consequent snowballing effect on contamination of the hospital environment. Staff carrier rates and numbers of infections acquired by patients in hospital are obvious guides to the degree of contamination present in a hospital, particularly if such observations are backed with phage type identification of strains.

Hospital workers in the past ten years have earnestly carried on with established preventive measures, but the extreme stimulus of the occasional dramatic infection now rarely occurs. During the same period, many new conditions have arisen in hospitals; ancillary departments with staff and equipment going from ward to ward have increased, new instruments have appeared of complicated type hard to clean; new materials for bedding and construction and new systems for ventilation have been introduced without much change in our basic methods for controlling infection.

The special research project directed in Shaughnessy Hospital, Vancouver, by Dr. J. C. Colbeck has demonstrated many sources and depots of infection, together with a number of inadequate measures for prevention of conveyance of infection. These results have been reported in detail in the *Canadian Services Medical Journal*. In essence, many of these results have shown that newer flooring materials, modern spring mat-

tresses, bathing facilities, and operating-room and surgical-dressing techniques are calling for revisions in aseptic and antiseptic methods when coupled with the steady stream of patients with resistant staphylococcal infection being admitted and cared for over relatively long periods. Dr. Colbeck and his collaborators have also demonstrated the need for active control of all hospital personnel, particularly those with staphylococcal infections, however mild.

The following recommendations and notes are based on the experiences and trials connected with Dr. Colbeck's investigations, on the experience of a massive "clean-up" at the Colonel Belcher Hospital in Calgary, and on continuing investigations at Queen Mary Veterans Hospital in Montreal. In the last-named institution, the occurrence of five consecutive postoperative infections (though mild) in December 1954 prompted the setting-up of a system for checking on the incidence of infection with the co-operation of Dr. E. T. Bynoe of the Laboratory of Hygiene, Department of National Health and Welfare, Ottawa (national centre for bacteriophage typing of staphylococci). This investigation has continued with particular emphasis on control of cleaning, laundry methods and sterilization of special equipment. Some aspects of the work at the Shaughnessy Hospital, Vancouver, and at Queen Mary Veterans Hospital, Montreal, together with Dr. Bynoe's work, were reported in the form of a symposium at the December 1955 meeting of the Laboratory Section of the Canadian Public Health Association.

The combined experience of these workers is well supported in the literature, and the general principles recently outlined by Colebrook¹³ are in harmony with the findings in our veterans' hospitals. *In essence it appears to be necessary for us to break away from the consideration of one factor at a time and from the idea that one facet of the problem is the "most important".* The alternatives cannot be summarized better than in Colebrook's words:

It is clear that there are many channels by which infection can spread in a hospital community. . . .

There are two alternative policies. We can accept the hazards that we have at present in our hospitals, in the belief that it is not practicable to reduce them very much, and put our trust in antibiotics and immunization and other antibacterial devices to deal with such infections as may come from time to time. . . .

The alternative is to strive continuously to block the many channels by which pathogens are transmitted in our hospitals so that the hazards of cross-infection are progressively diminished—and to keep our antibiotics and immunization as second line of defence.

In our experience of veterans' hospitals, the second alternative is the only one that seems to offer hope of lasting success, and the possibility of creating and maintaining "clean" surgical wards has been well demonstrated at the Colonel Belcher Hospital in Calgary, by Dr. Gordon MacQueen and co-workers.

In respect to "accepting present hazards" the argument is frequently employed that "infection rates" in a given hospital are as good as can be expected in the light of past experience. Since most staphylococcal infections are minor, they were in the past so overshadowed by more severe infections that reliable records for "rates" are not available. In the opinion of our hospital authorities such discussions are not of practical importance if careful investigation in any institution reveals patients or staff acquiring infection while in hospital. Regardless of the numbers of such infections, it is clearly our duty to promote preventive measures to the best of our ability without waiting for a series of very severe or fatal infections.

In practice, in order to implement the "blocking of many channels", many working subdivisions of the modern hospital must act in harmony—housekeeping services, nursing and ward services, resident and consultant medical officers, etc.—and the prerequisite in every hospital seems to be the *appointment of a committee on infection control* that will initiate a complete review.

The interdependability of the various factors which go to make up the problem of infections in hospitals is obvious, but in practice this must be emphasized because of the natural human tendency to focus on the first thing found to be in need of revision. Thus, in hospital A, cleaning methods may seem to be particularly poor, and much time and effort is put into their revision without very much being done about surgical-dressing methods, isolation techniques and the care of contaminated beds. In hospital B, surgical dressings, isolation and care of contaminated bedding may come in for major consideration but general cleaning techniques and anti-dust measures may not be studied very actively. In both cases, good and lasting results will not be likely.

The following notes and suggestions, many of them as yet incomplete, are presented in the hope that their guidance may be of assistance to any hospital that wants to start a review.

The factors which have to be controlled may be viewed in three general categories:

A. Sources

These are the active breeding grounds in which the staphylococci grow and multiply and from which the hospital constantly renews its supplies of infective bacteria.

B. Depots

These are the inanimate objects or materials on which and in which staphylococci may remain alive. Also, these are locations where bacterial populations may build up to dangerous levels by recurring contamination if methods are not used to eliminate the bacteria, either constantly or at frequent intervals.

C. Modes of Conveyance

These are the usually accepted types—aerial, aerosol or dust contamination; contact with human or inanimate objects or instruments that are contaminated; auto-inoculation of a wound or damaged area by staphylococci carried by the patient himself.

As far as possible, the following notes are intended to cover nearly all factors coming under these three headings, together with suggestions as to what might be considered practical control measures within the reach of any hospital from the standpoint of finance, physical plant and personnel.

A. SOURCES

These consist of actively infected people and of carriers.

1. *Individuals with active infections*

(a) *Visitors.*—The only controls that seem practicable are to have visitors report to the nursing station on each ward and to supplement this opportunity for brief scrutiny and warning with short, well-designed warning signs in main entries, in visitors' waiting rooms, elevators, etc. One such notice reads:—"VISITORS. Have you any 'cold', sore throat or skin infection? Even a mild infection may be dangerous to those you are visiting. Consult the nurse."

(b) *Staff.*—The regular ward staff actively engaged in treating patients is usually well controlled by nurses in charge or by senior doctors, but members of the many ancillary services that have increased greatly in the last 20 years are not usually trained as strictly. Responsibility for keeping various special technicians, such as physiotherapists, occupational therapists and social service workers, away from patients when these staff members have active infections must be fully appreciated by those in charge of such services and it must be their responsibility to see that these members of their staff are controlled medically, through a well-constituted hospital

health clinic. In respect to health clinics, it should be recognized that control of staphylococcal infections is a part of their duties akin to control of tuberculosis, enteric disease and venereal disease.

(c) *Patients*.—Those known to have active staphylococcal infections should be divided into two classes according to the nature of their lesions and treated according to their infectivity potential: (i) Those that cannot be prevented from contaminating their surroundings heavily (generalized skin infections, pneumonias, etc.), should be placed under a reasonable regimen of "isolation"—their rooms and room contents being treated as heavily contaminated. (ii) Those whose lesions (boils, carbuncles, draining sinuses, infected wounds, etc. can be rendered much less dangerous by strict dressing methods and by general control measures, should be "segregated" and not treated on open wards. Nursing methods and rules for other attendants must be clearly defined but need not be as strict as for the isolated cases. In one set of observations (Queen Mary Veterans Hospital), a room containing "isolation" patients showed bacterial air-counts* of 12-18 colonies per cu. ft. while a similar room with "segregation" patients showed 4-7 colonies per cu. ft. of room air, even though the techniques for surgical dressings at the time were not the most efficient for preventing spread of bacteria.

* Checks on treatment methods for these two classes should include:

For *isolation* in small wards or separate rooms under complete control of nurse in charge: Caps, masks, gowns, and gloves for attendants doing major handling of the patient, his excreta, his bedclothes, dressings, etc., but a minimum requirement of gowns for other attendants.

Safe hand-washing facilities (see below) for attendants, preceded by rinsing hands in a non-irritating disinfectant known to kill staphylococci in one minute (e.g. Cetavlon, Zephiran and others whose qualities are known).

Special "contaminated linen" arrangements for laundry (see below).

Special room cleaning and waste disposal (see below), to include if possible disinfection of room air at least once a day (germicidal aerosols).

Other checks that should be made are, for example, the training of the patient to contaminate his surroundings as little as possible by controlling coughing and spitting (adequate tissues), control of dressings, etc.

For *segregation* in small wards, nursing control is essential, but rules for gowning etc., need not be as strict.

Hand rinsing in germicide and good hand washing are very important.

If patients have bathroom privileges, careful provision for sterilization of toilet seats, wash basins and baths (see below) must be made by the nurse in charge.

Room cleaning, laundry arrangements and waste disposal must be those for "contaminated areas" (see below).

As nearly all these patients have localized lesions, special surgical-dressing techniques, designed to reduce contamination of surroundings to a minimum, are essential. Many workers have demonstrated heavy contamination of surroundings by migration of bacteria through dressings, by migration along moist skin surfaces adjacent to infected areas, by handling of dressings (particularly dressings in which exudate has been allowed to dry). Checks on present methods, with these factors in mind, should include consideration of the following: (a) Special care of normal skin areas to keep them constantly as dry as possible and free from staphylococci by using alcohol and a germicide such as Zephiran at least twice a day. (b) The use of *occlusive dressings* to cover the main dressings when there is much exudate, the borders of the occlusive cover to be adherent to surrounding normal skin. A grade of cellophane that allows "respiration" of water vapour without passage of moisture or bacteria can be used. Oiled silk should be considered in some situations. (c) The use of non-drying, antiseptic

emulsions in dressings such as one of the flavines in glycerin-paraffin mixtures. If it is considered undesirable to have an antiseptic in contact with the infected area, outer layers of dressing soaked in disinfectant have been shown to prevent migration of bacteria, and contamination of surroundings is much reduced if dressings are kept moist when changing. (d) The use of special "dirty" surgical-dressing rooms, according to individual hospital needs and facilities. (e) The cleaning of infected sites and immediate surroundings with germicide-detergent mixtures before applying new dressings. Non-toxic types that can be left on should be sought. Hibitane with Cetavlon may prove to be one of the best,* but other satisfactory agents can undoubtedly be found, provided neutralization by serous exudate or blood is watched and there is no interference with granulation tissue or phagocytic action of leukocytes.

2. Carriers

It is known that some individuals are constant or "permanent" carriers of pyogenic staphylococci, in their noses or on their skin surfaces (sebaceous glands), while others may pick up and harbour such organisms for a limited time only. The large volume of work involved and the lack of general facilities for the positive identification of different strains in controlled groups have resulted in a paucity of definitive data in this field. Even with the best hospital laboratory facilities, existing staff cannot hope to do more than check key personnel of operating rooms, surgical-dressing rooms and recovery rooms at reasonable intervals. The literature abounds with studies of carrier rates in hospitals, but in most cases the studies have been instituted because of concern over the patient infection rates in those hospitals. In general, it may be estimated that at any one time extra-hospital nasal carriers are 12-18% and skin carriers are 8-12% of the general population, whereas surveys of intra-hospital personnel, particularly ward staff, reveal 60-80% nasal carriers and 30-50% skin carriers. Several investigations have shown that carrier rates amongst student nurses and expectant mothers rise abruptly after their entry into hospitals. It seems logical to suppose that this rise in carrier rate should be in direct proportion to the amount of general contamination in a particular institution.

Ideal control of carriers would consist of frequent swabs from nose and skin areas of all ward staff and patients, with bacteriophage typing of all strains of pyogenic staphylococci found and subsequent correlation of carriers with infections in patients or staff and with the finding of new carriers. Such a program is too onerous for any existing laboratory staffs in veterans'

*Using GE Electrostatic air-sampler.

*According to laboratory experiments by Imperial Chemical Industries' pharmaceutical branch and Ayerst, McKenna and Harrison, Limited.

hospitals, but special study groups may tackle such a problem.

Under everyday circumstances, it is felt that a definite attempt can be made in any hospital to pick out persistent carriers of large numbers of pyogenic staphylococci from amongst operating room and other key personnel groups; that such "permanent carriers" can be controlled through the hospital health clinic; that active treatment should be tried in each case, choosing appropriate measures from among the following: immunization with toxoid and/or autogenous vaccines; persistent treatment with non-fatty, non-oily detergent nasal creams or sprays containing non-toxic antiseptic agents or antibiotics such as tyrothricin, neomycin, etc., not usually given parenterally; persistent regimens of skin washing with antiseptic soaps or detergents and/or antiseptic creams (e.g., hexachlorophene, Zephiran, Cetavlon, Hibitane preparations, etc.).

Perhaps the greatest factor in controlling infection conveyed by carriers is that of educating the staff to consider everyone a potential carrier and to take such obvious precautions as, not breathing in others' faces, avoiding talking or coughing over patients, and doing frequent efficient handwashings.

In surgical practice, according to the facilities of each hospital, consideration should be given to the finding of carriers of heavy nasal or skin infection amongst patients coming up for operation. It is suggested that an attempt should be made to find such carriers amongst those whose projected operations will open up a field in which any kind of infection is liable to be catastrophic, and preoperative treatment instituted. Because nearly every surgical service has slightly different techniques for preoperative skin preparations and most feel that their results are good, no attempt is made here to recommend specific techniques. In the light of past experience, it would seem advisable to have the following questions answered in respect to any technique in common use:

Is a sufficiently large area rendered clean and dry before the final antiseptics are applied?

Is the soap or detergent used for preliminary washing known to have no antagonistic effect on the antiseptics used?

Is it definitely known that the antiseptics being used have enough time to kill the pathogenic bacteria before operating is started?

Is there good evidence that the antiseptics used have reasonable diffusing powers and can destroy bacteria deep to the skin surface (in sebaceous glands, etc.)?—i.e., has their efficacy been checked by well-controlled experiments in which biopsies were taken, and was the antiseptic neutralized when specimens were cultured?

It is recommended that a check should be made on the precautions taken to prevent patients from contaminating operating or dressing fields by heavy breathing, sputtering or coughing. In many instances, cultures taken on the operating side of inadequate screens can pick up staphylococci from the patient's nose, particularly if the anaesthetist is not actively endeavouring to prevent such transmission.

B. DEPOTS

Colbeck and other workers in the past have demonstrated that pyogenic staphylococci survive long periods in dried dust, in mattresses or other bedding, in neutral soaps or soapy films of wash basins and baths. It is well known that invisible particles of dust in the air may contain many bacteria and may remain suspended indefinitely if kept stirred up by air currents, movements of people or machinery, etc. In all these cases, the bacterial population may build up to dangerous concentrations if rates of contamination are abnormally high, or if adequate measures for removing or killing the bacteria are not in force.

The rates of contamination are dependent upon the control of active sources as noted above (Section A).

The control of depots may be divided into two general categories, the elimination of potential depots and the care of depots that cannot be eliminated.

1. Elimination of depots

The elimination of depots in practice is naturally limited by the importance of the area being reviewed. Operating rooms, recovery rooms, surgical-dressing rooms and wards in which infected patients are being cared for head the list and, in these places, any potential depot should be considered a menace.

The principal depots that have been demonstrated by various workers are as follows, and are mentioned because they can usually be removed from the immediate environment of the patient, or can be changed for more easily cleaned types:

Flooring materials with unsealed joints, or cracks, or non-smooth surfaces (regular building maintenance inspection service).

All sharp corners between walls and floor, or wall and wall, together with ornamental ledges on skirting boards or higher up the walls.

Venetian blinds and roller blinds (substitute non-glare glass or single thickness curtains that can be laundered).

Furnishings with tops higher than 4' 6" (lockers, cupboards, etc.). Also, furnishings or equipment with complicated, irregular, hard-to-clean surfaces; e.g., if possible, use anaesthetic machines with smooth outer cabinets and place operating room lights above a glass ceiling.

Radiators, particularly those boxed in; electric or other radiant heat panels flush with walls substituted.

Equipment that cannot be sterilized or cleaned reliably. This should be eliminated, paying particular attention to equipment used on wards, much of which

has not been designed with sterilization in mind, e.g., plastic items of various types (soap dishes, some types of light fixtures, waste receptacles, etc.).

Bar soap. This should be removed from all key areas and dispensers of fluid soap substituted.

Cleaning machinery or equipment that cannot be thoroughly cleaned, laundered or otherwise sterilized; e.g., floor polishers, some types of oiled mops and some vacuum cleaners may become more and more contaminated and release more and more bacteria when in use.

2. Care of depots that cannot be eliminated

It is axiomatic that all treatment areas should have the best possible methods in use, but in practice, gradations are necessary as it is obviously impossible to look after wards on the same basis as operating rooms.

If patients with staphylococcal and other active infections are segregated, three general areas can be taken up for review: (a) operating rooms and other areas in which particularly vulnerable patients are being cared for; (b) wards and rooms particularly contaminated because infected patients are being cared for therein; (c) other treatment areas in which contamination rates are minimal and dangers of cross-infection are not too great. The strictness or frequency with which methods for cleaning out depots are applied has to be graded according to the area, but it is felt that the accompanying notes are applicable to all areas to some degree:

(a) *Washing and bathroom facilities.*—Hand wash-basins should be used as much as possible, with running water, having mixing faucets with elbow or knee-controls and no plugs in key areas. In patients' bathrooms, a definite regimen of cleaning with a known, quick-acting (1-2 minutes) non-odorous, non-irritating germicidal detergent (Wescodyne 75 p.p.m., Roccal 1:2,000, Fixanol C 1:400, etc.) should be established—twice a day in ordinary areas and after each use in infected or key areas. Baths, shower mats and toilet seats should be treated similarly. Hand basins or other equipment used by bed patients must be collected and sterilized after use, particularly in infected wards.

In all these examples a well-established routine is the most important feature *provided the capabilities of the materials are known.*

(b) *Linen and bedding.*—The handling of all soiled linen should be reduced to a minimum and linen exchange for wards should be based on a clean linen quota replacement system rather than on a counting of dirty linen check. This is of particular importance when arranging for linen from infected patients. Such contaminated linen should be folded gently and placed directly into clearly marked bags, the contents of which are subject to special handling in the laundry, according to methods recommended by the Canadian Research Institute of Launderers and Cleaners, or those recommended in the Manual of Operations for Hospital Laundries (American Hospital Association).

Blankets are famous for retaining large numbers of bacteria and for distributing them in "lint". The laundry methods for all blankets should be checked to see that vegetative forms of bacteria (e.g., staphylococci, streptococci, *M. tuberculosis*) are killed either by heat (140° C. for 30 minutes) in fluffing machines, heat in special drying and stretching cabinets, or the use of an efficient germicide (e.g. chloramine-T types of compounds such as Sterichlor or Monochloramine B). If one is sure of the efficacy of the blanket laundering, it is important to see that the hospital routine calls for its being done on the discharge of every patient. It is also important to check on special blankets such as those kept in operating and recovery rooms, at the same time seeing that the warming cabinets are not contaminated. The laundering of blankets must, of course, be obligatory after use around an infected patient. If it can be arranged, there is much evidence in favour of "dust-proofing" blankets—particularly those on the beds of infected patients—by treating with an oily germicidal mixture, using: Fixanol C as recommended by Colbeck⁵³ for mattress covers, also Barnard⁴⁹ and Loosli *et al.*,⁴⁸ or Cetyltrimethylamine bromide as reported by Blowers and Wallace.⁵¹

Mattresses have been shown, particularly by Colbeck,⁵³ to be dangerous depots and it seems probable that the bellows-action of a modern spring mattress promotes speed and amount of contamination as compared with felt or hair mattresses. The spring mattress also presents sterilization difficulties as it is soon ruined by steam and deteriorates when exposed repeatedly to formalin vapour. If it were not for the phenomenal cost of equipment and supplies, ethylene oxide sterilization would be best for mattresses and would be applicable to other hospital problems such as the disinfection of clothing or disinfestation of clothing and luggage. This problem is under study and there is promise of a solution.

Pillows from infected patients should be autoclaved or, if the laundry is equipped with the special machine required, should be laundered with treatment of feathers with live steam.

Protection of mattresses and pillows from contamination is under active investigation. Complete slip covers made of heavy ticking should always be used and Colbeck has presented evidence to suggest that a final rinse for such covers with a Fixanol oily mixture will give almost complete protection. Hospitals that have tried other protection such as plastic covers report that their imperviousness to moisture creates too much discomfort for routine use. Until a method for sure protection is evolved, mattresses and pillows—at least from known infected cases—must be sterilized, either with steam or formalin vapour, subsequently neutralized with ammonia.⁵³

(c) *Room dust and dirt.*—No two hospitals are precisely the same when flooring materials, the state of the floors, other dust-collecting surfaces and cracks and crannies are examined in wards and other treatment areas.

Floors are naturally the greatest repositories of dust, and therefore it is felt by many authorities that "dust-laying" agents should be maintained on all floors in treatment areas. Observations at Q.M.V.H. indicate that, while the maintenance of such a layer is undoubtedly helpful, frequent efficient cleaning can maintain almost as good conditions when judged by bacterial counts of room air. All studies have indicated that it is important to eliminate all systems which tend to raise and distribute bacteria from floors and, therefore, it is important in treatment areas to avoid the use of mechanical polishers that cannot be sterilized; vacuum cleaners whose outflow is in the room and is not filtering out bacteria; or other equipment that cannot be sterilized frequently. Six types of vacuum have been tried to date and neither the usual dry types nor the two wet-pick-up types observed have trapped the bacteria flowing through them. For example, one good industrial-type vacuum, checked at Q.M.V.H. recently, gave the following results with plain agar plates: Exposed for 2 minutes in draught from an electric fan playing on floor—166 colonies. Ex-

posed to efflux of vacuum operating dry over the same floor for 2 minutes—288 colonies. Exposed to efflux of vacuum picking up the wet mop water from the surface of the same floor for 2 minutes—280 colonies. These colony counts were total counts of all kinds of bacteria, not staphylococci particularly.

Floor waxes have been under intensive study by various authorities, including the manufacturers. Many modern waxes that give a particularly hard, long-lasting surface at the same time fail to hold down contaminated dust, or even to trap it when first spread. They also tend to discourage frequent washing of the floors. Other waxes will kill bacteria when first applied but there is little or no residual killing power after periods such as 72 to 96 hours, and staphylococci have been recovered from such wax in contaminated wards—an observation again which supports the need for frequent washings.

The addition of different types of *oily mopping* over waxed surfaces has certain advantages, but the disadvantages seem to outweigh them when areas known to be contaminated are considered. Unless the cleaning staff is particularly intelligent and well trained, light oily mops tend to be used violently so that dust is stirred up; we do not know of a suitable oily preparation that is completely self-sterilizing (so that such mops can be used several times in contaminated areas without being sterilized and reimpregnated); the impregnating, etc., usually has to be done by the commercial supplier.

Air contamination in the form of very fine particles or aerosols is a well-established problem, and air sampling, even after the best room cleaning, will always yield some bacteria which will eventually fall out on to cleaned surfaces. In special areas such as operating rooms, surgical-dressing rooms and wards, particularly those that are known to be contaminated, the air of the room must not be forgotten when considering "depots" of infection. For this reason it is felt that cleaning systems cannot be really complete until practical *germicidal aerosols* can be used. Studies are in progress, but several commercially sponsored varieties are on the market and may be tried. It is hoped that a cheap, relatively fast-settling (two hours or less) aerosol can be found. Ethylene glycol dispersed in particles of 20 to 40 microns may prove satisfactory and cost less than 5 cents a time when used for an average four-bed ward. In view of these general considerations, the following procedures can be recommended at the present time:

1. *The use of a water-based, non-skid, self-polishing floor wax.* In special areas, a similar wax incorporating a germicide which will kill staphylococci in one hour or less should be used. It may turn out to be desirable to keep a dust-laying, germicidal layer of glycols on the waxed surface by putting glycols in the rinse-water used for moistening broom covers and dusters. Investigations are proceeding.

2. If a *dust-laying layer* is desired instead of wax, 1% glycerin in the wash water appears to be effective and non-damaging for ceramic, vinyl or asphalt tiles, while a spindle oil (such as Imperial oil—Forum 40) can be used for linoleum if applied as recommended in the M.R.C. memorandum No. XI of 1944.

3. *For routine daily or twice-daily cleaning* of wards, sweeping is recommended, using a *moist duster* draped over a swivel-headed broom, a loose trailing edge being left so that the implement can only be used by pushing forwards. Routine dusting in wards should also be done with moistened dusters. For ordinary areas these dusters and floor cloths may be moistened with detergent in

water, but for contaminated areas a non-toxic, non-irritating, non-odorous germicide should be used in a concentration known to kill staphylococci in less than 2 minutes (e.g. Fixanol C 1:200, Roccal 1:1,000, Wescodyne 75 p.p.m. or others that have been well tested).

All dusters and floor cloths used in contaminated areas must be placed in specially marked laundry bags, as for contaminated linen.

Weekly or twice-weekly cleaning, to include high dusting and floor scrubbing, should be considered obligatory and a germicidal detergent used at least for contaminated rooms or special areas. These weekly routines are best done by teams of cleaners under working foremen who can be trusted to do a thorough job on difficult items such as bed frames, radiators or Venetian blinds. A thorough wash-down system for entire rooms should also be established and used at monthly intervals or when infected patients are vacating a special ward. This same wash-down routine may be employed for operating rooms, etc., that have been contaminated. For washing of walls and scrubbing of floors, industrial-type plastic pad mops would seem to be best as they tend to suck dirt out of cracks and are also easily kept free from staphylococci after use in contaminated areas.

4. Ideally, a *germicidal aerosol* should be used daily or weekly (according to the amount of contamination thought to be present) in order to clear the air of the room or ward *before* the general cleaning is done, but *after* such procedures as bed-making or dressing changing.

In our experience, the efficacy of the cleaning procedures depends upon simplicity of equipment or supplies, upon the training plus the direct supervision of cleaners, and upon the inspection standards, spot-checking, etc., maintained by the nursing service, the "house-keeping" service and the bacteriologist.

- (d) *Other ward or treatment equipment.*—All articles of equipment used by infected patients should be considered in the light of their individual potentials for maintaining collections of bacteria. One of the commonest of such depots is the *waste basket* into which tissues and other infected material are thrown. At least for contaminated areas, only *disposable paper bags* should be used for waste.

The special equipment and supplies emanating from or used by *ancillary services* should be reviewed, and efficient cleaning methods introduced where necessary for: physiotherapy, ECG and oxygen therapy equipment, occupational therapy supplies, library supplies, and barber's equipment.

In cases such as library books, where staphylococci cannot easily be killed, their use by infected patients should be forbidden.

The sterilization and cleaning systems for other types of equipment should be reviewed department by department. Many modern instruments used in such specialties as anaesthesia, urology, and pulmonary function, are made up of metal, plastic and rubber materials plus, in many cases, electrical connections, and sterilization methods have become exceedingly complicated. It is hoped that in the near future the use of ethylene oxide or some other non-damaging germicidal agent may be developed to simplify these problems.

C. MODES OF CONVEYANCE

By tradition, barriers to the conveyance of infection are very largely based upon the willingness of those handling infections to give thought

to their actions. As stated in other sections of these notes, one of our present problems is to re-awaken a strong desire to prevent infection in the absence of the former dramatic consequences of a let-down in our defensive systems. In financial terms of loss of time from work and of additional hospitalization, minor staphylococcal infections are serious. In terms of human misery, boils and other recurring minor infections are serious also, but the full and constant realization of these calls for a persistent educational campaign maintained with the backing of the senior hospital authorities—chiefs of clinical services, hospital superintendents and matrons being essential proponents. For example, Dr. H. O. Dillenberg recently reported to the Saskatchewan Hospital Association that in investigating minor infections in a hospital nursery, staphylococci were found "in the ointment jar, on strings of pearls on a baby, on the nursery door-knob, on spectacles of a nursery nurse, on sponges after autoclaving, in a nurse's aide's face powder and on her diamond ring, on the door-knob of the elevator, etc." Such transient contamination can and does occur whenever the attending staff has allowed accepted practices of hand washing, avoidance of clothing contamination, safe waste disposal, etc., to lapse because of a false sense of security. In all these instances, *conveyance by handling* is probably the biggest factor, and a careful check of hand-washing routines, use of hand-disinfectant rinses on leaving contaminated areas, ease of access to well-set-up hand-washing facilities, can cut down conveyance of infection. Conveyance by handling is of course guarded against routinely in special areas by wearing rubber gloves, by special scrubbing of the hands, etc. In several investigations, reductions in numbers of bacteria on the hands through the use of germicidal soaps or detergents have been reported, but skin is not sterilizable. There is some suggestion that modern surgical rubber gloves are more easily punctured than their coarser predecessors and it has also been shown that the interiors of gloves quickly build up a considerable bacterial population in the course of an operation, staphylococci reappearing if the wearer had some on his skin before scrubbing. This mode of *conveyance through punctured gloves* may deserve attention. Perhaps it may be found possible to obviate this danger by using a light hand cream containing Hibitane or other

non-irritating germicide and leaving it on the hands while gloves are worn.

Other contact conveyance from skin should be considered, bearing in mind the fact that *sweating* always brings about a great increase in surface flora and provides a medium for such flora to permeate cloth. Colbeck has demonstrated such penetration through surgeon's gowns if these are not backed by a plastic apron.

Airborne infection, either in the form of very finely divided dried particles or in the form of fine aerosols from respiratory sources, has always been recognized as a hazard. In general, methods for preventing such conveyance have to be graded according to the importance of the area being considered, operating rooms being at the head of the list. In some hospitals, special surgical-dressing rooms such as those for burns in Birmingham have been placed in the same category. In checking such areas, the following points are worthy of consideration:

1. Air in corridors, etc., outside operating rooms proper, nearly always contains more bacteria than that in the operating room (OR) itself and therefore all drifts of air should be outward; i.e., air in OR's should be under slight *positive pressure*, the whole OR suite should be under the same positive pressure and all doors from OR's and from the whole suite should open outwards. As far as possible, forced air inlets for OR's should be well baffled and spread out so as to make the incoming air drift into the room in all directions, causing air currents without causing actual draughts.

2. *Air conditioning* systems will undoubtedly save their cost many times over if they include dust filtration, ionic field precipitation, ultraviolet irradiation and automatic humidification. As a part of this system, it should be noted that contamination from sweating is a proven hazard in the OR, and the relationship of humidity to temperature has received some attention, particularly in the U.K. and France. Professor Walker (University of Bristol), Professor Dott (Edinburgh Royal Infirmary) and the Boucicault Hospital in Paris are cited in the Nuffield Provincial Hospitals Trust report on the Functions and Design of Hospitals as being in favour of *lower temperatures*. It seems probable that 70° F., 60% humidity and about 10 to 12 changes of air per hour may soon be considered optimal.

3. In other areas requiring some special treatment, the intermittent use of *germicidal aerosols* can be of assistance.

Conveyance of staphylococci on *clothing* has been well demonstrated by Duguid (1948) and others. Usual hospital practices of changing white coats and uniforms frequently, of wearing gowns and caps, etc., when required, are our usual protections, but some special points may be worth checking and correcting when considered practicable:

- (a) *Lockers and changing rooms* have been shown to get quite heavily contaminated from the manipulation of day clothes if a good proportion of those using the rooms are staphylococcus carriers. It follows that it is desirable for the users to don their outer, clean, hospital clothes in another, clean room if such can be arranged (if possible, after a shower). In OR suites, surgeons' dressing rooms should be considered in this respect, and white cotton over-boots particularly should not be put on in the contaminated locker room.

(b) Clothing, bed clothes, etc., from open wards should be kept out of special areas such as ORs. Staff from recovery rooms, oxygen therapy departments, etc., where contamination from coughing or other sources may be heavy, should be watched as possible conveyors of infection on their clothes.

Other modes of conveyance are by contact with contaminated instruments and materials, as mentioned in foregoing sections.

CONCLUSIONS

Because a careful study of the available literature, plus personal observations across Canada and the receipt of information from various correspondents, has failed to reveal well-defined and specific reasons for one hospital's suffering an outbreak of staphylococcal infections while another continues with relatively little trouble, it seems that every hospital should consider itself just as open to endemic staphylococcal infection as any other. It also follows that all methods of prevention should be pursued concurrently to the best of our ability, on the basis of there being no known cure-all. In this regard, the systematic rechecking of all our existing methods seems to be the only practical approach.

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RÉSUMÉ

Le staphylocoque est un des microbes qui a résisté le plus résolument à toutes les mesures prises dans les hôpitaux pour s'en débarrasser ou le tenir sous contrôle. Les malades infectés par un type résistant ne guérissent pas à la maison, finissent par être admis dans un hôpital où ils sont en mesure d'infecter les autres malades. Le personnel toujours augmentant de nos grands hôpitaux ainsi que l'emploi d'appareils de plus en plus compliqués rendent le problème du contrôle du staphylocoque de plus en plus complexe. D'après Colebrook, l'infection peut emprunter plusieurs voies pour se propager dans un milieu hospitalier. De deux choses l'une: on peut, on bien laisser faire et se fier aux antibiotiques, vaccins ou autres médicaments anti-bactériens; ou alors, peut-on surveiller continuellement ces voies de transmission et les interrompre à mesure qu'elles sont découvertes? Cette seconde attitude, la seule qui compte, demande la collaboration de tous les départements et les services d'un hôpital sous la direction d'un comité de contrôle des infections. La recherche de la propagation des infections doit porter sur:

1. Les sources où le staphylocoque peut se multiplier, tels que visiteurs, membres du personnel et malades. On doit faire le dépistage des porteurs de germes et les traiter si l'on en trouve. Il faut insister sur les techniques d'isolement, de décontamination, de pansements, et de nettoyage des locaux. Il n'est pas inutile d'insister sur l'amélioration des méthodes de préparation des champs opératoires.

2. Les réservoirs doivent être réduits à leur plus simple expression si on ne peut les éliminer totalement. Il faut combler les fissures des murs et des planchers, faire disparaître les garnitures inutiles, les plafonniers compliqués et les armoires trop hautes, remplacer les pains de savon par du savon liquide, renouveler fréquemment certains items de nettoyage qui se prêtent mal à la stérilisation. Les salles de bain doivent être nettoyées à l'aide d'un détergent germicide au moins deux fois par jour. La literie doit être stérilisée à la buanderie; les matelas présentent encore un problème qui n'est pas

résolu. Le balayage des planchers doit se faire en soulevant le moins de poussière possible (les aspirateurs ne semblent pas recommandables). La contamination aérienne peut être combattue par des aérosols germicides tel le glycol d'éthylène. Dans les salles, les récipients en papier ne servant qu'une fois devraient remplacer les paniers à rebuts.

3. Les voies de propagation sont en grande partie à la merci de la collaboration de ceux qui traitent les in-

fections. La vigilance de ceux-ci doit s'exercer à des mesures de sécurité aussi banales que le lavage des mains, le port de sarraus spéciaux, etc. Les gants de caoutchouc doivent fréquemment subir une inspection minutieuse afin de vérifier s'ils ne sont pas troués. Les salles d'opération devraient avoir un système d'aération comprenant filtration et climatisation de l'air et être à une pression légèrement supérieure à celle des corridors adjacents.

M.R.D.

OCULAR CONSIDERATIONS IN FACIAL PARALYSIS*

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FACIAL PARALYSIS, by involvement of the orbicularis oculi, can result in serious complications in the eye. In addition to the therapeutic problems presented by the ocular complications, facial paralysis presents a diagnostic problem in the localization of the facial nerve lesion. Facial paralysis occurring in conjunction with various ocular palsies is a sign of considerable localizing value.

The ocular complications¹ of facial paralysis consist of *epiphora*, *paralytic ectropion* and *lagophthalmos*. Epiphora is often the first and in mild cases the only symptom of paralysis. It is always present and is due both to the falling away of the lower lid from the globe with eversion of the punctum, and to the loss of pumping action of the lacrimal portion of the orbicularis muscle.

Paralytic ectropion may follow long-standing paralysis in younger persons, and in older persons usually appears early. When paralytic ectropion is present, the conjunctiva is subjected to the changes from exposure common to all types of ectropion.

Lagophthalmos, or inability to close the lids, may result in serious damage to the cornea from exposure and desiccation. Corneal ulceration with all its disastrous sequelæ may occur.

ANATOMY

The facial nerve is principally a motor nerve, but contains as well parasympathetic and special sensory fibres.² The motor fibres take origin in the facial nuclei in the pons, in close relationship to the abducens nuclei, around which the facial fibres form a loop, before

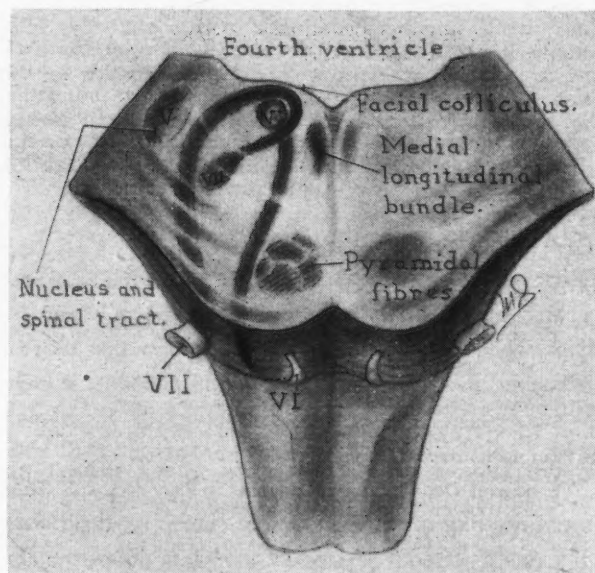


Fig. 1.—Cross-section of the pons, showing the relations of the facial nucleus and the course of the facial nerve fibres within the pons.

emerging at the lower border of the pons (Fig. 1). The supranuclear innervation of the motor nucleus is bilateral for the frontalis and orbicularis muscles, and unilateral and crossed for the muscles of the lower face (Fig. 2). The facial nerve enters the internal auditory meatus with the acoustic nerve, passes through the petrous temporal bone in the facial canal, and leaves the skull by the stylomastoid foramen. Within the temporal bone the only motor branch is that to the stapedius muscle.

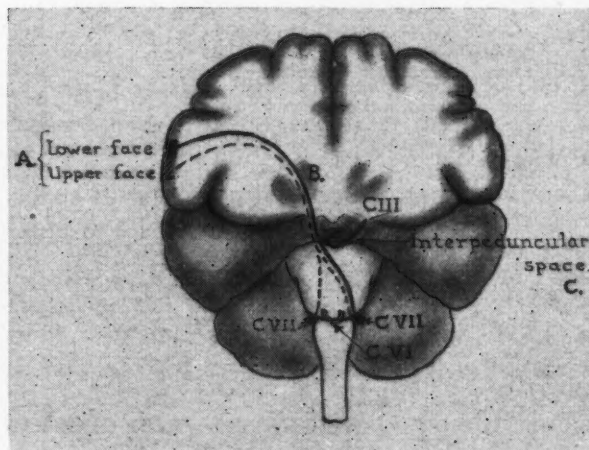


Fig. 2.—The supranuclear motor pathways of the facial nerve.

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Beyond the stylomastoid foramen the nerve passes forward into the parotid gland, in the substance of which it divides into its terminal branches, supplying the muscles of the face—the important muscle from the standpoint of this paper being the orbicularis oculi.

The sensory portion of the facial nerve forms a separate root, the nerve of Wrisberg. The cell station for the sensory fibres is the geniculate ganglion, a swelling on the facial nerve just inside the facial canal. The peripheral fibres from this ganglion pass in the chorda tympani to supply taste sensation to the 2/3 of the tongue anterior to the circumvallate papillae, and in the greater superficial petrosal nerve to supply taste to the soft palate.

The parasympathetic fibres take origin in the superior salivary nucleus. They are secretomotor to the sublingual, submandibular and lacrimal glands. The fibres destined for the sublingual and submandibular glands are distributed via the chorda tympani, and those for the lacrimal gland via the greater superficial petrosal nerve (Fig. 3).

DIAGNOSIS OF FACIAL PARALYSIS

This is made on the history of epiphora, inability to close the eye, difficulty in articulation, and a sensation of stiffness in the affected side of the face. Examination of a typical case, with the face in repose, shows a flattening of the normal skin creases, loss of the nasolabial fold, widening of the palpebral aperture, drooping of the corner of the mouth and drawing of the mouth toward the sound side.

The function of the involved side of the face is affected so that the patient is unable to bare the teeth, to whistle, and, depending on the location of the lesion, to close the eye or wrinkle the brow. When he attempts to close the eyes, the palpebral fissure of the involved side remains open, and the eye tends to turn upwards. This associated eye movement is known as Bell's phenomenon, and serves to protect the cornea to a certain degree during sleep.

Should the chorda tympani branch be involved, there is loss of taste in the anterior two-thirds of the tongue. Involvement of the branch to the stapedius muscle produces hyperacusia, that is, an intensification of loud noises.³

As an adjunct to clinical diagnosis, the study of the electrical reaction of the muscles of the face is of value. An intact nerve contracts with either faradic or galvanic stimulation, indicating that the nerve is capable of conducting an impulse. When the nerve has degenerated and the muscle is still intact, a contraction takes place with galvanic stimulation only. When no contraction takes place with either current, the muscle fibres have undergone the "reaction of degeneration".⁴

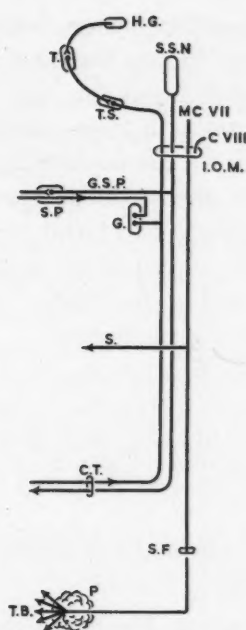


Fig. 3.—Diagrammatic schema of the motor, sensory, and parasympathetic components of the facial nerve. T.B.—terminal branches to muscles of face; P.—parotid gland; S.F.—stylomastoid foramen; C.T.—chorda tympani; S.—branch to stapedius; G.—geniculate ganglion; S.P.—sphenopalatine ganglion; I.O.M.—internal auditory meatus; S.S.N.—superior salivary nucleus; T.S.—tractus solitarius; T.—thalamus; H.G.—hippocampal gyrus; M.C. vii—motor root, facial nerve.

SITES OF FACIAL NERVE LESIONS

Facial paralysis may result from lesions which are supranuclear, nuclear, or infranuclear. The bilateral cortical representation of the fibres supplying the orbicularis and frontalis muscles provides the principal differentiation between supranuclear and both nuclear and infranuclear lesions. In a supranuclear lesion, the muscles of the upper face are only slightly affected, while in nuclear and infranuclear lesions the upper and lower muscles of the face are equally affected.

Supranuclear lesions may be subdivided as follows:

1. *Cortical lesions:* These result from involvement of a centre believed to exist in the frontal lobe just anterior to the precentral convolution. This produces the dissociated facial weakness known as mimic paralysis, characterized by loss of emotional movements, with retention of voluntary movements.

2. *Internal capsule lesions:* These constitute the commonest supranuclear lesion, and are usually the result of a vascular accident. The muscles of the upper face are only slightly affected, emotional movements (laughing, etc.) are unimpaired, and there is paralysis of voluntary movement of the lower face.

3. Interpeduncular space lesions: A space-occupying lesion in this location presses on the cerebral peduncle, and on the trunk of the oculomotor nerve as it traverses the space (Fig. 2). The pressure on the corticofacial and corticospinal fibres in the peduncle produces a contralateral hemiplegia and facial paralysis, and the pressure on the oculomotor nerve produces a homolateral third nerve palsy. These findings constitute Weber's syndrome.⁵

In all supranuclear lesions, there is no diminution of excitability of the facial nerve to faradic stimulation, and the reaction of degeneration in the muscles of the face does not take place.⁶

Nuclear and infranuclear lesions may be considered together:

1. Pontine lesions: These are characterized by involvement of neighbouring structures. Involvement of the region at or just above the abducens nucleus, to include facial fibres and the pyramidal tract, produces homolateral abducens and facial paralysis, loss of conjugate deviation of the eyes to the same side, and contralateral hemiplegia. These findings constitute Foville's syndrome. A similar lesion just below the abducens nucleus spares its association fibres, leaving conjugate deviation intact; this constitutes the Millard-Gubler syndrome.⁷ A congenital hypoplasia in the region of the abducens and facial nuclei produces the picture of the Moëbius syndrome, i.e. a bilateral facial weakness and loss of abduction of both eyes.

The pontine lesion of greatest danger to the eye is one involving the facial nucleus and the trigeminal nuclei. With the resultant loss of corneal sensation and the facial paralysis, the eye is subjected to the dangers of both lagophthalmos and neuropathic keratitis.

The lesions that may occur in the pons to produce these various pictures include tumours, syringobulbia, disseminated sclerosis, vascular lesions, and poliomyelitis.

2. Cerebello-pontine angle lesions: The commonest lesion in this location is an acoustic neuroma. This tumour is characterized by a progressive unilateral deafness, loss of corneal sensation due to stretching of the fifth nerve over the expanding tumour, and a facial paralysis. The latter is usually incomplete despite the close anatomical relationship of the acoustic and facial nerves.⁸

3. Petrous temporal bone lesion: Here the facial nerve may be damaged by fractures, middle ear infections, surgical operations on the ear, and congenital lesions. In this region the chorda tympani may be involved, or the nerve to the stapedius, resulting in loss of taste on the anterior two-thirds of the tongue, or hyperacusia, respectively.

In this situation we also encounter the controversial problem of geniculate herpes. Ramsay Hunt described the syndrome as a herpes zoster inflammation of the geniculate ganglion, with vesicle formation on the pinna of the ear, external auditory meatus, the pillar of the fauces, and anterior two-thirds of the tongue, accompanied by a facial palsy. It has since been questioned whether the motor division of the facial nerve is damaged by associated inflammation of the geniculate ganglion, and whether the geniculate ganglion provides sensory fibres to the external auditory meatus.⁹ It is possible that some of the herpes zoster syndromes with associated facial palsy depend on the concurrent involvement of two or more cranial nerves.¹⁰

4. Lesions in the stylomastoid foramen: Here the facial nerve is subjected to some form of acute inflammation which produces the familiar clinical picture of Bell's palsy. Whether this inflammation is an interstitial neuritis or a perioritis is not known. It is the most frequent cause of facial paralysis, usually affecting young adult males. While there may be no apparent predisposing cause, there is often a history of an acute nasopharyngeal infection or exposure to a draught on the affected side. The onset of Bell's palsy is sudden, and the paralysis usually complete. The inflammation may ascend to involve the chorda tympani and the nerve to the stapedius. Recovery is the rule, some power returning by three weeks. In some cases, however, recovery may take months or years, by which time the muscles of the face undergo the reaction of degeneration, leaving a permanent facial weakness.

Beyond the stylomastoid foramen the facial nerve may be involved by compression from parotid tumours, inflammation from adjacent suppurating glands, metastatic lesion, trauma, and neuritis in any of its branches.

TREATMENT

The ocular management of facial paralysis depends upon the degree of paralysis, the an-

anticipated duration of the paralysis, and the associated neurological lesions. The aim of treatment is to prevent the complications to the cornea and lids, already mentioned. The chief problem is to decide which cases of facial paralysis require a tarsorrhaphy.

For purpose of discussion, the cases may be divided into four groups:

Group 1 consists of supranuclear lesions, where the orbicularis is only slightly affected. These cases require no treatment.

Group 2 consists of lower motor neuron lesions in which one may predict recovery in a matter of weeks. Most cases of Bell's palsy fall into this group. Until the orbicularis regains its function, these cases require: (a) Instruction in the proper technique of blotting the tears, rather than wiping the eye. This helps prevent eversion of the punctum, and paralytic ectropion. (b) Instruction in moistening the cornea by "digital blinking", that is, looking down and drawing the upper lid over the eye with a finger. (c) Instruction in the use of a bland ointment, such as mercury bichloride, at night.

Group 3 consists of lower motor neuron lesions in which recovery is delayed for months or years. These include congenital lesions, traumatic lesions, middle ear infections, nuclear lesions, nerve grafts, and some cases of Bell's palsy. Here the treatment varies, depending on the age of the patient. It has previously been noted that a younger person less frequently develops a paralytic ectropion; in the absence of this, the regimen may be similar to that for Group 2, with careful watch on the cornea for abrasions. As an added protection, one may prescribe a Tovell shield; this is a clear plastic, perforated side-piece which fits on to the lateral frame of the patient's glasses, and extends along the temple to a point posterior to the lateral orbital margin. Should these measures fail to adequately protect the cornea, as evidenced by recurrent corneal abrasions, a tarsorrhaphy is indicated, and should be done promptly.

When paralytic ectropion develops, as it usually does early in older persons, one must take steps to correct it before hypertrophy and epithelialization of the conjunctiva takes place. This may be done by performing a tarsorrhaphy, which may be divided at a later date if the orbicularis recovers. A paralytic ectropion which has been present a considerable time may require a fascial sling to replace the lid.

In Group 3, and those cases in Group 2 where the paralysis has lasted longer than anticipated, the muscles of the face should be given electrical stimulation to prevent their undergoing the reaction of degeneration.

Group 4 consists of lower motor neuron lesions with an associated trigeminal lesion, in which there is loss of corneal sensation accompanying the facial paralysis. This occurs in brainstem, cerebello-pontine angle, and some traumatic lesions. In these cases the eye is exposed to the dangers of both lagophthalmos and neuropathic keratitis, and a tarsorrhaphy is mandatory. Here the use of the Tovell shield provides additional protection. Treatment of these cases must be instituted early, for the eye is in grave danger.

SUMMARY

The ocular complications of facial paralysis are indicated, and the neuro-anatomical basis for the various types of facial paralysis is discussed. The ocular management is considered in relation to the type and duration of the paralysis, and the presence of other neurological lesions. Stress is placed on the prompt treatment of concurrent facial paralysis and trigeminal lesions with loss of corneal sensation. The localizing value of syndromes which include facial paralysis and various ocular palsies is indicated.

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A PLEA FOR A RATIONAL OUTLOOK ON THE INTERNAL FIXATION OF FRACTURES*

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VENABLES, STUCK AND BEACH in 1937 showed that bone was not resorbed in the presence of electrolytically inert metal. As the result of their work and the consequent introduction and use of the inert alloys, 18/8 mo. steel, vitallium and the like, coupled with the stimulus to traumatic surgery of a world war, the last 15 years have seen an enormous increase in the use of operative fixation of fractured bones. It has also seen the rapid rise and equally rapid fall in popularity of certain individual methods of fixation, of which the Küntscher nail is perhaps the best example.

The internal fixation of a fracture is never a life-saving and seldom a limb-saving matter. Our aim in the employment of internal fixation is to achieve a more rapid, more sure and more complete return of function. If this be so, it is important that from time to time we examine our experience critically and meticulously to discover whether we have in fact achieved our purpose, whether the hazards of the method are justified, and whether we are not just being carried away by enthusiasm for an attractive technique. We must in fact ask ourselves from time to time, in relation to even established procedures, why we use internal fixation at all.

What then should be our approach? I submit that first we should remind ourselves of the old adage that a fracture consists of an injury to bone and an injury to soft parts, and that our object in internal fixation is the attainment of an accurate and rigid immobilization of the fractured bone in order that we may treat the injured soft parts by early functional activity, unrestricted as far as possible by external encumbrances. In effect the internal fixation of a fracture is not primarily a method of treating the bone, but a method of "neutralizing" the fracture in order that we may treat the soft parts in the best and most unrestricted way possible, starting from the time of injury.

Any method, however attractive it may have seemed at first, which on review of a sufficiently large number of cases does not show conclusively that by the method a significant num-

ber of patients have thereby gained a quicker, more certain and more complete return of function, without running an undue risk of complications resulting from the method itself, must be drastically revised or abandoned. I would add that this review must be a personal one and that because surgeon A working in clinic X achieves results that are satisfactory, it does not of necessity follow that the same happy results will follow in surgeon B's hands, still less in the hands of the occasional virtuoso.

There are fractures which require no fixation of any sort or will unite satisfactorily with no more than a minor degree of restriction and support. For these, internal fixation is clearly not justified. Examples of such fractures are: fractured shaft of clavicle, and impacted fracture of the neck of the humerus.

It is suggested that for the purpose of this discussion all other fractures can be classified as follows:

(a) *Fractures in which only by open reduction and fixation can a satisfactory functional result be obtained*, e.g. (1) Intracapsular fractures of the neck of the femur. (2) Fractures in which reduction has failed by the interposition of soft parts—probably the only justification for fixation of the mid-shaft of the femur.

(b) *Fractures where anatomical reposition of the fractured parts is necessary for good function*. This group is largely concerned with fractures involving joints, e.g. (1) Monteggia (Fig. 1) and Galeazzi (Fig. 2) fractures of the forearm. (2) Fracture separation of the medial malleolus of the tibia. (3) Fracture separation of the olecranon process.

(c) *Fractures which require prolonged immobilization for stability and union, this immobilization requiring fixation of major joints*, e.g. fractures of the shaft of the tibia.

(d) *Fractures which while not requiring a rigid immobilization for union of the affected part yet need prolonged recumbency until union is achieved*, e.g. (1) Trochanteric fractures of the femur. (2) Fractures of the shaft of the femur.

It is over these last two groups that discussion must chiefly centre.

Most of us would probably agree that the high fracture of the shaft of the femur with flexion and abduction of the proximal fragment is best treated by internal fixation, for the fracture is difficult to realign and may require prolonged immobilization in spica or in bed on a

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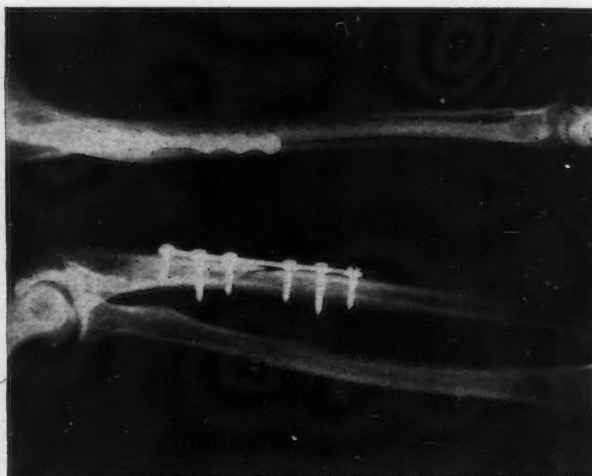


Fig. 1a and b.—Monteggia fracture of the forearm.

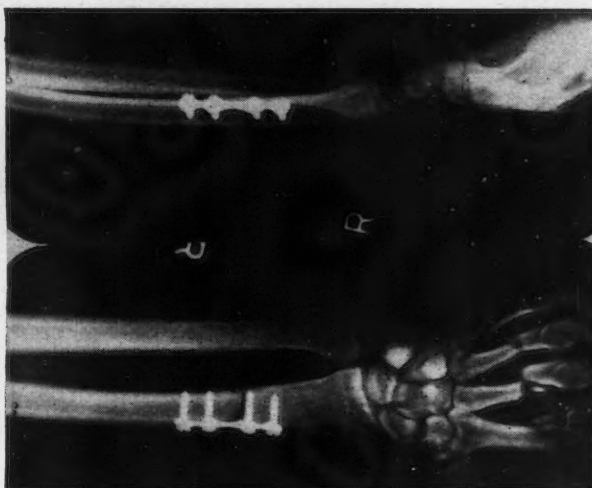


Fig. 2a and b.—Galeazzi fracture of the forearm.

Thomas splint. Some of us feel that this is almost the only place for the Küntscher nail (Fig. 3). Again we probably all agree that the basal fracture of the neck of the femur in the elderly is better fixed by the nail plate, to avoid prolonged recumbency.

What, however, of the fractures of the shaft of the tibia? For these, if treated conservatively, prolonged immobilization of knee, ankle and tarsus is unavoidable. How much does this matter and how great an improvement in the rapidity and the completeness of the return of function can be achieved by internal fixation?

There is, clearly, considerable divergence of practice here. Some surgeons would still oppose the use of internal fixation in almost every case. Others feel that open realignment and fixation of the unstable fracture by two or three screws is permissible, but that the foreign material introduced should be minimal. Here the bone alone is being treated and the same immobiliza-



Fig. 3.—High fracture of the shaft of the femur fixed by Küntscher nail.



Fig. 4.—Oblique fracture of tibia secured by an oval-holed plate and six screws.

tion of joints and soft parts is required as in the first method.

Yet others believe that in the absence of skin loss or excessive skin damage, internal fixation by a method sufficiently rigid to allow external

fixation to be dispensed with and full movements of knee, ankle and tarsus to be practised *ab initio*, is the method of choice.

It has been the practice of my colleague, Mr. G. S. Ellis, and myself for some ten years now

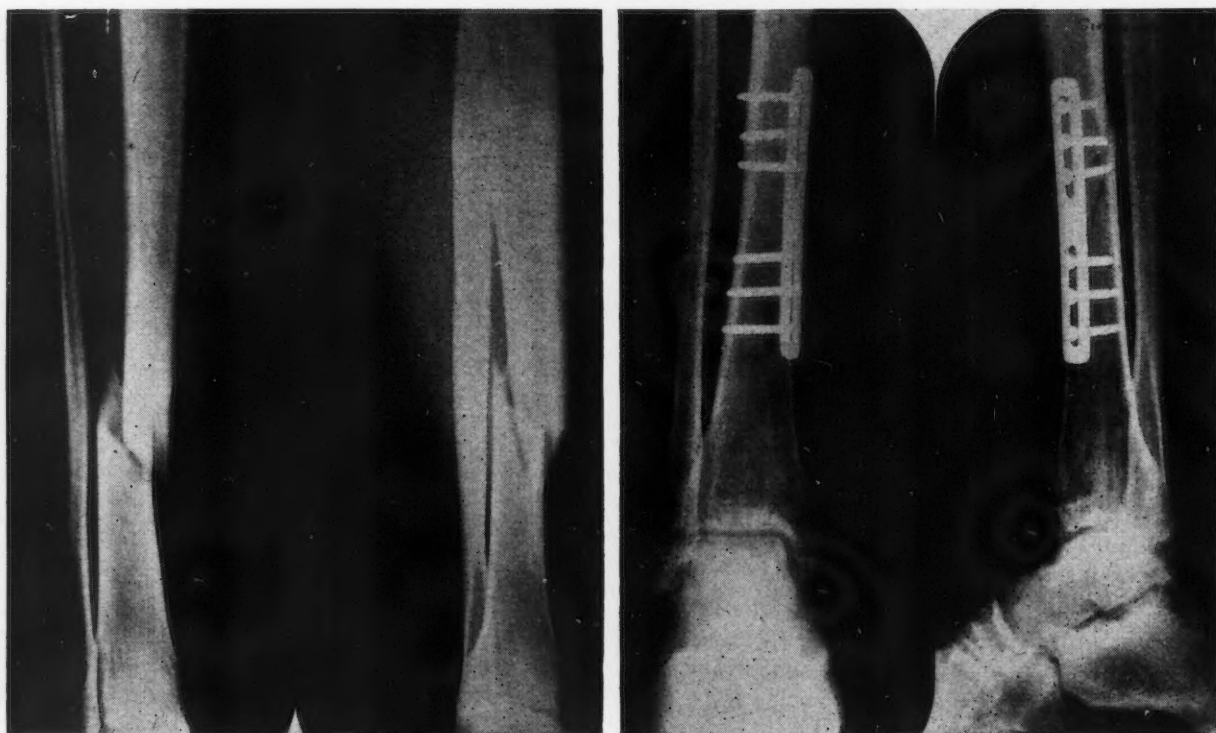


Fig. 5.—Oblique fracture of tibia secured by an Eggers plate and six screws.

to use rigid internal fixation by a plate and six screws in selected cases (Fig. 4). No external fixation is employed initially and the patient is encouraged from the day after operation to move knee, ankle and tarsus maximally, the limb being kept elevated and no weightbearing allowed. When full movement is restored and all bruising and oedema has disappeared, usually one month after operation, a full weightbearing walking plaster is applied and maintained until

method is justified by the results, provided the selection of cases is correct and the operation carried out by a surgeon experienced in bone surgery in a theatre whose staff is trained in the technique appropriate to such surgery.

The employment of the methods of internal fixation of fractures is thus rational only if we can claim to know clearly why we employ the method at all—as we have attempted to show,

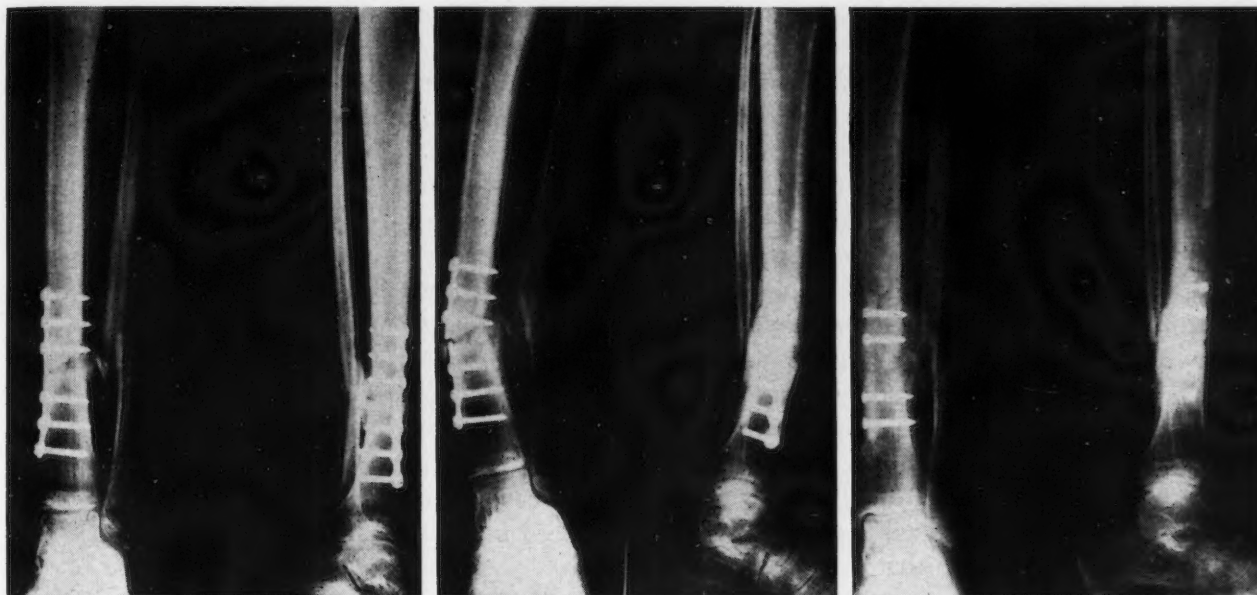


Fig. 6.—Transverse fracture of lower third of tibia secured by round-holed Lane's plate and followed by absorption of the fracture site with fracture of the plate. Ultimate union secured by bone graft. Time of total disability, 18 months.

full bony union is achieved. This method, I believe, achieves the object of internal fixation set out earlier. Patients treated in this manner regain knee, ankle and tarsal movement after removal of the plaster with a rapidity far greater than the conservatively treated patient and although the rate of union is not accelerated it is, we believe, equally not retarded, provided slotted (Fig. 5) or oval-holed plates are used. There is no doubt that the patients, especially women, are grateful for anatomical restoration of alignment, contour and length. However, there can be an appreciable complication rate. No surgeon who has treated any number of cases by such a method can claim that there have been no cases which have not developed a low-grade infection around plate or screw, necessitating later removal, or that there have been no cases of delayed union or non-union (Fig. 6). Nevertheless we believe that the

this is not exclusively or even primarily to treat the fractured bone—and, furthermore, rational only if we can satisfy ourselves that in our own hands the methods are justified by the improved results achieved.

OPTIC ATROPHY IN PRISONERS OF WAR

It will be recalled that a common finding in prisoners of war held by the Japanese was visual loss, varying from slight to severe and from transient to permanent. The question arises whether the ophthalmological changes due to severe nutritional deficiency are progressive or not. Baird and MacDonald (*Canad. Services M. J.*, 12: 485, 1956) have examined all 54 of the ex-prisoners from Hong Kong who were pensioned on account of visual disability, and find that ten years after the original examinations no significant changes in the eye condition have taken place. Nine out of the 54 ex-prisoners continue to show macular degeneration; 25 have central scotomata, seven have peripheral constriction of the field and 12 have both central scotomata and peripheral constriction. The authors suggest the possibility that peripheral constriction of the field may be a functional factor and not associated with any eye lesions.

PROLONGED HYPOTHERMIA IN TREATMENT OF MASSIVE CEREBRAL HÆMORRHAGE*

A PRELIMINARY REPORT

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TWO PRINCIPLES of practical value were derived from a study of massive cerebral hæmorrhage to be reported by one of us (D.A.H.).

1. Death is always caused by the tentorial pressure cone. The cerebral hemispheres increase in volume and this swelling displaces the brain stem downwards and sometimes sideways, through the hiatus in the tentorium cerebelli. Downward displacement leads to ischæmia of the posterior diencephalon, midbrain and pons. If lateral displacement is added, hæmorrhages and red infarcts may also be seen in the territory of the basilar and posterior cerebral arteries. The hæmatoma accounts for only part of this increase in cerebral volume. The brain tissue around the hæmatoma is swollen, and evidence will be published which suggests that ventricular and subarachnoid hæmorrhage may provoke so much swelling of the brain that the patient dies of the tentorial pressure cone without any large collection of blood in the cranium. As a rule, hypertensive patients die more rapidly than normotensive, though there is no significant difference in the size of the hæmatomata. Hæmorrhage is usually brisker in the hypertensive patient and the pressure in the hæmatoma cavity may reach higher levels.

2. Massive cerebral hæmorrhage destroys relatively few fibres at the onset and never tears the internal capsule. Once formed, the hæmatoma first paralyzes and later destroys the brain tissue in the wall of the cavity by compressing it, in essentially the same manner as an extramedullary spinal tumour first paralyzes and then destroys the spinal cord. Ischæmic necrosis continues in the wall of the cavity as long as the pressure remains high in the hæmatoma, and it usually proceeds more rapidly in patients with high blood pressure. It is this progressive

ischæmic necrosis which destroys the compact fibre pathways such as the internal capsule and is responsible for most of the residual neurological disability in patients who survive massive cerebral hæmorrhage.

The slower developing cerebral hæmatomata commonly encountered in normotensive patients may be evacuated at craniotomy in the first few days of the illness. The mortality after surgery is not high and the residual disability may be trivial. Surgery is of little value when the hæmatoma forms as rapidly as it does in the majority of hypertensive patients. Few survive early operation, either because the pressure cone had already reached an irreversible stage or because the brain remains too swollen after the hæmatoma has been removed. The hæmatoma may be evacuated after the first few days in the exceptional patient who is still alive, but by this time extensive necrosis of the cavity wall has already occurred. Therefore a method of reducing the cerebral volume was sought which would allow early effective operation in the more acute forms of massive cerebral hæmorrhage.

It has been observed at craniotomy that the brain can be made slack, and the hemispheres reduced in volume, in three different ways.

1. NEGATIVE WATER BALANCE

It has been known for many years that if a patient has nothing to drink and several magnesium sulphate retention enemas are given, a swollen brain may be reduced in volume and he may even be aroused from the coma of the tentorial pressure cone. Conversely, it has been noted on several occasions that a drowsy patient with infarction of the territory of the middle cerebral artery, who has received little to drink for two or three days, will quickly become comatose and die after an intravenous injection of a litre of 5% glucose in water. Intravenous injections of hypertonic solutions, such as sucrose, have a similar effect in reducing the brain volume, but it rapidly swells again when the injected substance is excreted. Though this method of reducing the brain volume is of value, it is not powerful enough alone to control the swelling in massive cerebral hæmorrhage.

2. ARTERIAL HYPOTENSION

It has been noted at craniotomy that the brain is slack when ganglion blocking agents are used

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to reduce the systolic blood pressure to the neighbourhood of 70 mm. Hg. In one very drowsy patient with massive cerebral hæmorrhage, not included in this series, the blood pressure was lowered by the use of such a drug and he promptly lapsed into coma as his blood pressure fell. It was concluded that this treatment was more effective in increasing the ischæmia of the brain stem than reducing the cerebral volume.

3. HYPOTHERMIA

One of us (J.G.S.) had the opportunity of watching one of Dr. Botterell's operations on intracranial aneurysms under hypothermia. Dr. Botterell pointed out that the brain was slack, and he has since reported this effect of hypothermia.¹ This method of reducing the cerebral volume has distinct advantages over the use of hypotension alone. It allows the brain stem and the compressed wall of the hæmatoma cavity to survive ischæmia longer, because of the reduction in metabolic rate, and for the same reason protects the heart and kidneys from the ischæmic effects of low blood pressure.

TECHNIQUE

The patients were cooled by means of ice bags in the groins and axillæ, alcohol sponging and fans, until the rectal temperature fell to between 32° C. and 30° C. (90° F. and 86° F.), and as far as possible it was maintained between these two levels. On several occasions opening the windows in the Canadian winter hastened the fall in temperature, and once a patient was immersed for an hour in a cool bath to which ice was added. The patients were placed semiprone to prevent inhalation of vomit, and care was taken to prevent the upper shoulder dropping forward and obstructing the venous return from the head. Tracheotomy was employed on several occasions to facilitate aspiration of secretions from the bronchi and to prevent slight respiratory obstruction, which also causes a rise in intracranial pressure. None of the patients was conscious enough to require anæsthesia, but liberal doses of paraldehyde were given to prevent restlessness and seizures. Chlorpromazine, 50 mg., was given by intramuscular injection at the onset, and half this dose was repeated whenever the patient shivered or vomited. Sometimes additional doses were given if peripheral constriction

in the arm vessels prevented recording the blood pressure by means of the ordinary sphygmomanometer cuff, if the systolic blood pressure rose above 90 mm. Hg or if difficulty was found in cooling the patient. Promethazine, 50 mg., was also given by intramuscular injection at the onset to control shivering, and half this dose was repeated once only. No fluids were given during the first 48 hours and afterwards they were limited to 200-300 c.c. a day, in addition to a quantity equivalent to the daily urine output, to add the full brain-shrinking effect of a negative water balance. The continuous attention of a nurse was required in addition to much medical supervision. Rectal temperatures were measured with the ordinary long glass thermometers found in biochemical laboratories. Records were kept of the rectal temperature, pulse, respirations, blood pressure, size of pupils and level of responsiveness as well as fluid intake and output. Various laboratory investigations were carried out as time and opportunity allowed.

CASE REPORTS

A diagnosis of fulminating massive cerebral hæmorrhage was made in ten moribund patients. They had all been in fairly good health before the onset and six were without any symptoms of disease. All were treated with prolonged hypothermia, but case reports will be given only of the eight patients in whom the diagnosis proved to be approximately correct. Though the results are extremely disappointing, they do indicate the value and limitations of this method of treatment.

CASE 1.—G.G., aged 72, retired. This right-handed man was admitted to the Cerebrovascular Unit of the Queen Mary Veterans Hospital at 4 p.m. on August 19, 1955, 12 hours after being found unconscious with a left hemiplegia. In 1950 he had been found to have mild diabetes and a B.P. of 170/105. On admission he responded to pain only by sluggish voluntary movement of the right arm and both legs, and attacks of extensor rigidity in the right arm. The pupils were small, equal and fixed to light; the pulse rate was 90 and the B.P. 200/110; respirations were between 40 and 50, deep and interspersed with prolonged apnoæic pauses. Hypothermia was begun that evening and maintained for four days and eight hours. Because he was stout and the weather hot, it took 24 hours to lower his rectal temperature to 30° C. (86° F.). By this time respirations were 20 and regular, the B.P. was 100/60, and he responded briskly to pain. On August 23, he was totally anuric and the blood urea nitrogen rose to 77 mg. per 100 c.c. When the rectal temperature rose to normal next morning, he was alert but totally aphasic and without voluntary movement in his left limbs. The urine output and blood urea nitrogen quickly returned to normal. Later he had two severe attacks of bronchopneumonia, and four weeks after ad-

mission he had a severe epistaxis. He died seven weeks after admission from massive gastric hæmorrhage.

At autopsy the convolutions were not flattened, though there was a hæmatoma approximately 5 cm. in diameter in the right lenticular nucleus, which had destroyed the posterior limb of the internal capsule and ruptured into the body and temporal horn of the lateral ventricle. There was a small superficial ulcer of the greater curvature of the stomach, and the gut was full of old and recent blood. Except for moderate left ventricular enlargement and minimal portal cirrhosis, there were no gross or histological abnormalities of importance.

COMMENT

The dramatic improvement in this patient with massive cerebral hæmorrhage was unexpected because he was so moribund on admission that it was thought that the tentorial pressure cone had reached an irreversible stage. The hæmatoma was not evacuated for several reasons which seem less adequate in retrospect. He developed anuria, but renal function appeared to recover completely on warming, and there was no microscopical evidence of renal damage at autopsy. The terminal hæmatemesis was not related to the illness or method of treatment, in our minds, until it was encountered in other cases.

CASE 2.—N.J., aged 58, a foreman. This hypertensive man was admitted to the Montreal General Hospital on November 3, 1955, two hours after the onset of a massive cerebral hæmorrhage. He was then in full coma with fixed dilated pupils and sustained decerebrate posture. Hypothermia was begun at once and by 3¼ hours the rectal temperature had fallen to 30° C. (86° F.) and the B.P. from 300/160 to 130/80. Respirations remained at 28 throughout. Half an hour later he inhaled vomit and died. No autopsy was obtained.

CASE 3.—I.P., aged 65, a secretary. This hypertensive woman was admitted to Montreal General Hospital at 3.30 p.m. on November 24, 1955, having been found unconscious a few hours before. She responded only to pain by withdrawing the right arm and both legs. The pupils were equal and reacted to light, pulse 56, B.P. 190/80, respirations 24 and regular. Hypothermia was begun at 5.30 p.m. and continued until her death 50 hours later. In three hours the rectal temperature fell to 28° C. (82.5° F.) and in four hours the B.P. was 80/50 and respirations 15. There was an increased responsiveness to pain overnight but her condition deteriorated next morning when the right pupil was dilated. Angiograms showed a berry aneurysm at the bifurcation of the right middle cerebral artery. The skull was opened by Dr. Harold Elliott, the aneurysm clipped and the hæmatoma evacuated from the temporal lobe. The pupil returned to normal that evening, but the blood pressure fell and proved difficult to maintain with noradrenaline. By the morning of November 26, both pupils were dilated and fixed to light, and at 8 p.m. that day she died. There was complete anuria from shortly after the onset of hypothermia until her death. No autopsy was obtained.

COMMENT

Both these cases illustrate that there is a limit to the power of hypothermia to control the ten-

torial pressure cone. In Case 2 the respiratory rate did not rise after the onset of treatment, and Case 3 showed a transitory improvement. The peripheral circulatory failure in Case 3 may have been caused by massive gastric hæmorrhage.

CASE 4.—L.H., aged 66, an insurance broker. This hypertensive man was admitted to the Montreal General Hospital at 10.30 p.m. on November 25, 1955, having been found unconscious a few hours before. He was then drowsy and confused. He complained of severe headache and epigastric pain. There was a severe but incomplete left hemiplegia. The pupils were minute and equal and reacted to light. Extensor attacks were obtained in the left arm in response to pain. Rectal temperature 37.2° C. (99° F.); pulse 72; B.P. 180/90; respirations 24 and regular. The abdomen was tender. His condition remained unaltered for 12 hours and then deteriorated rapidly so that by 4 p.m. on November 26, he responded only sluggishly to pain. Hypothermia was started at 4.45 p.m. and maintained for 30 hours. Within five hours rectal temperature fell to 32° C. (90° F.). The pulse rate varied between 90 and 120, but the B.P. fell to 90/60 and respirations to 16. He became so alert and restless that heavy sedation with paraldehyde was required. At 4 a.m. on November 27, the B.P. was unobtainable and thereafter was maintained with noradrenaline. Ventriculograms were made and at craniotomy a hæmatoma about 6 x 4 x 4 cm. was evacuated from the temporal lobe and deep sylvian region. The rectal temperature was 32° C. (90° F.) when the skull was opened, and the brain was found to be slack even before the mass of blood clot was removed. Massive gastric hæmorrhage was not suspected to be the cause of the peripheral circulatory failure until the morning of November 28, and the patient died just as a blood transfusion was being started, at 9 a.m. He was anuric throughout the hypothermic period and until his death 11 hours afterwards.

At autopsy the brain convolutions were not flattened and there was no temporal lobe herniation or gross evidence of brain stem damage. There was no significant reaccumulation of blood clot in the hæmatoma cavity. The anterior limb and genu of the right internal capsule was intact but the posterior limb was necrotic. A shallow ulcer 4 mm. in diameter was found in the pyloric region of the stomach, and the gut was full of old and fresh blood. Histological evidence of definite, but minimal, tubular nephrosis was found in the right kidney but not the left.

COMMENT

The response to hypothermia in this patient was excellent and it might have been possible to save the internal capsule completely if treatment had not been delayed until his condition had deteriorated. This patient died of gastric hæmorrhage and not of his intracranial disease. Since that time, blood has been kept available for emergency transfusion in all cases subjected to hypothermia, and no subsequent patients have been lost because of this complication. This patient had epigastric tenderness and pain before the onset of treatment and therefore hypothermia cannot be held entirely responsible for the gastric hæmorrhage. The renal damage was much less

than might be expected after such a long period of anuria and most probably occurred after the temperature returned to normal.

CASE 5.—M.P., aged 60, night watchman. This man was admitted to the Cerebrovascular Unit of the Queen Mary Veterans Hospital, Montreal, at 8.30 p.m. on December 29, 1955, seven hours after the onset of a massive intracranial hæmorrhage. At this time he showed no voluntary movement or speech in response to any form of stimulation. There were frequent spontaneous attacks of extensor rigidity in both arms and legs, and the pupils were minute, equal and fixed to light. Rectal temperature was 41° C. (106° F.), pulse 120, B.P. 135/85, and respirations averaged 40 in spite of prolonged apnoeic pauses. Hypothermia was started at 11 p.m. and was maintained for just over three days. The rectal temperature fell to 30° C. (86° F.) in about six hours and remained remarkably constant. Respirations became regular at 20, pulse 60, and B.P. 60/40. The extensor spasms ceased in six hours and he was more alert in twelve. After 36 hours he was restless, groaning and moving all limbs spontaneously. Ventriculograms at this stage showed gross dilatation of the lateral ventricles and swelling of the left thalamus; the third ventricle could not be filled. On returning to the ward at 1 p.m. on December 31, after ventriculography, he had a series of minor focal seizures and from then on his condition steadily deteriorated, in spite of ventricular drainage. He died six days after admission. The urinary output varied between 250 and 500 c.c. a day during the hypothermic period. Though he never showed glycosuria or ketosis, the blood sugar level was 294 mg. per 100 c.c. on admission and reached 666 mg. at the end of the hypothermic period.

At autopsy in addition to blood clot in the thalamus and third and fourth ventricles, the left lateral ventricle was full of blood. This was not present in the ventriculograms. The convolutions were not flattened. No other significant abnormalities were found and the histology of the heart, liver and kidneys was normal.

COMMENT

The hæmorrhage in this patient was not localized clinically. He had gross internal hydrocephalus causing a tentorial pressure cone, but the hæmorrhage was so placed that it also damaged the upper brain stem directly, and therefore the cause of the symptoms and signs in this patient was complex. However, he responded dramatically to hypothermia until the second episode of hæmorrhage, which may have been precipitated by ventriculography.

CASE 6.—A.T., aged 52, a railway shipping clerk. This hypertensive man was admitted to the Montreal General Hospital at 1 p.m. on December 31, 1955, having fallen unconscious one hour before. On admission he was restless and confused. He had a complete left hemiplegia. The pulse rate was 80, B.P. 200/100, respirations 48, deep and interspersed with prolonged apnoeic pauses. He became unconscious quite rapidly at about 3 p.m. and within ten minutes the right pupil dilated and became fixed to light. Hypothermia was started at 3.30 p.m. Within five hours the rectal temperature fell to 30° C. (86° F.), pulse 60, B.P. 115/70 and respirations 30. Shortly before this time good voluntary power had returned in the left arm and leg, the pupil returned to normal size, and he opened his eyes and squeezed a hand when asked to do so. The aggravation of the pres-

sure cone coincident with a decrease in paralysis was thought to be due to rupture of the hæmatoma into the ventricle. It was erroneously concluded that no large hæmatoma remained in the substance of the cerebrum. Therefore on January 3, the temperature was allowed to rise. When it reached 35.5° C. (96° F.) he responded only sluggishly to pain, and all voluntary movement disappeared from the left limbs. He was rapidly cooled again and when the temperature reached 30.5° C. (87° F.) a craniotomy was performed. When the skull was opened, the brain was slack even though it contained a large hæmatoma, measuring approximately 8 x 3 x 4 cm., deep in the right posterior sylvian region. After it was evacuated, the cavity was found to communicate with both the body and the temporal horn of the lateral ventricle. The day following operation, January 5, the temperature was allowed to rise to normal and he was able to speak and drink. The fluid output during hypothermia varied between 100 and 300 c.c. a day and by January 6, the blood urea nitrogen level had risen to 97 mg. However, it quickly fell to normal. He developed a staphylococcal pneumonia on January 7, which slowly responded to antibiotics. A tarry stool was passed on January 13 and on January 16, twelve days after operation, he had a massive gastric hæmorrhage, which was treated by transfusion of six bottles of blood. Minor complications were a thrombophlebitis of the left leg and an acneiform eruption. By March 1, 1956, he was perfectly alert and rational. The left arm remained completely paralyzed, but power had begun to return in the leg and a month later he could walk fairly well. The B.P. was 160/90.

COMMENT

The response to hypothermia was excellent in this patient. The temporary recovery of power in the arm shows that the internal capsule was not destroyed at the onset of the hæmorrhage, but it must have sustained severe ischæmic necrosis when the patient was warmed on the fourth day. The massive gastric hæmorrhage was treated at once by blood transfusion, several bottles of blood having been kept available for him from the time of his admission.

CASE 7.—L.W., aged 45, a salesman. This man was admitted to the Cerebrovascular Unit of the Queen Mary Veterans Hospital, Montreal, at 11.30 p.m. February 23, 1956, 3½ hours after falling unconscious. There was no history of ill health before this event. At midnight he showed no spontaneous voluntary movement and responded to pain by very sluggish withdrawal of the right limbs and bilateral extensor spasms. The left limbs were flaccid when not stimulated, the neck was stiff and the pupils were minute, equal and just responding to light. The pulse rate was 44, B.P. 210/100 and the respirations 30 with prolonged apnoeic pauses. Hypothermia was begun at 12.30 a.m. February 24, and his rectal temperature fell to 34° C. (93° F.) in two hours and to 32° C. (90° F.) in seven. By this time he showed little improvement and the pupils though still small were fixed to light, though his B.P. had fallen to 100/60 and respiration rate to 20. From then on he slowly improved. He responded a little to commands on the morning of February 27 and therefore he was slowly warmed. His rectal temperature reached 36° C. (97° F.) by midnight and normal 24 hours later. On the morning of February 29, he first spoke but remained confused until March 11. At this stage he showed a left hemiparesis, severe in the face and mild in the arm and leg. There was no sensory loss or visual field defect. Several E.E.G. studies con-

firmed the clinical localization of a low right posterior frontal lesion. However, bilateral carotid angiograms on the day following admission and five weeks later showed a normal vascular tree without displacement from a space-occupying lesion or evidence of a vascular anomaly. A lumbar puncture on March 7 showed yellow cerebrospinal fluid under high pressure. During hypothermia his urinary output fell to between 170 and 230 c.c. daily. He became excessively dehydrated, the blood urea nitrogen reaching a peak of 102 mg. % on February 29, when he showed a little hæmaturia. Afterwards his renal function quickly returned to normal. In the sixth week of his illness he had three brief attacks of unconsciousness, thought to be epileptic. Convalescence was slow, but by the fourth month he had made a complete mental and physical recovery except for a little left facial and shoulder weakness. He has a mild persistent hypertension.

COMMENT

The present diagnosis in this patient is that of a small cerebral hæmorrhage complicated by massive ventricular hæmorrhage. Such cases are ideal for treatment with hypothermia because there is very little brain destruction.

CASE 8.—M.L., aged 28, a labourer. This man was admitted to the Montreal General Hospital at 10.30 a.m., March 5, 1956, having fallen unconscious 2¼ hours before. At 11.15 a.m. he showed no voluntary movement spontaneously or in response to any form of stimulation. Bilateral attacks of extensor rigidity were frequent. The neck was stiff. Both pupils were fixed to light, the right being 2 mm. in diameter and the left 8 mm. There was a little papilloedema and a large subhyaloid hæmorrhage in the left fundus. The pulse rate was 85, B.P. 170/70, and respirations 34 with prolonged apnoeic pauses. Hypothermia was begun at 12.10 p.m., the patient being cooled quickly by immersion in a cool bath to which ice cubes were later added. In one hour the rectal temperature fell to 33.3° C. (92° F.); he was then taken out of the bath and cooling was continued by the usual method. The most striking change during this period was the contraction of the left pupil to about 3.5 mm. and a slight dilatation of the right pupil to equal the left. Throughout the rest of the day rectal temperature varied from 33.3° C. (92° F.) to 31.6° C. (89° F.), pulse 80 to 100, B.P. 100/40 to 130/70, and respirations 18 to 22. Extensor attacks became less frequent and he responded to pain. A left carotid angiogram in the afternoon showed a substantial shift of the anterior cerebral artery to the right and an arteriovenous malformation on the medial surface of the left parietal lobe measuring 6 cm. in its maximum diameter. In the operating room that evening, brain tissue was found to bulge through a left parietal burr hole when the rectal temperature was 32° C. (90° F.), and therefore he was actively cooled until the rectal temperature fell to 30° C. (86° F.). This produced a fall in systolic blood pressure from 100 to 70 mm. Hg, and a completely slack brain when the skull was opened. A hæmatoma about 8 x 5 x 5 cm. was evacuated from lateral to the angioma. The cavity was found to open into the body of the lateral ventricle. Some of the vessels leading to the angioma were clipped, but it was not removed. During the following day difficulty was encountered in preventing shivering and the temperature rose at times to normal. Subsequently full hypothermia was maintained until a week after the onset of the illness. A tracheotomy was performed on the morning following operation. His condition improved slowly and slightly. Extensor spasms eventually disappeared and when he was finally warmed he groaned and moved the left arm spontaneously. During the five days

after hypothermia was terminated his condition remained fairly static. On March 16, his respiratory rate rose and while a large mucus plug was being aspirated through a bronchoscope he developed complete respiratory obstruction and died.

The blood pressure had failed to rise on warming, and on the evening of March 13 he had had a brisk hæmatemesis requiring a transfusion of three bottles of blood. Several studies of the coagulation, bleeding and prothrombin times, clot retraction, capillary fragility and platelet count showed no significant abnormality, including studies a few hours before and the day after the hæmatemesis. Very high gastric acidity was observed. Urinary output varied between 200 and 400 c.c. a day during hypothermia. Renal function was slow in recovering, perhaps because the hæmatemesis delayed the rise in blood pressure on warming, and the urine specific gravity was only 1.020 on March 15, in spite of a severe negative water balance. The blood urea nitrogen level reached a peak of 140 mg. and the serum potassium 5.8 mEq./l. on this day. There were no other significant abnormalities in the electrolytes.

At autopsy there was moderate flattening of the convolutions without evidence of herniation of the temporal lobe through the tentorium cerebelli. There was no obvious lesion of the brain stem. The blood clot had been adequately removed and there was no evidence of fresh bleeding from the angioma. There was a pale softening of the left temporal pole and the orbital surface of the left frontal lobe. This was a fresh lesion which may have accounted for the persistent brain swelling. Its etiology was obscure, but it may have been caused by arterial spasm as in the red infarcts described by Robertson³ in ruptured berry aneurysms. The lungs were oedematous, the bronchial tree was full of secretions, and there was a moderately severe degree of bronchopneumonia. There was an aseptic thrombophlebitis of the veins of both adrenal glands with massive hæmorrhage into the left one.

COMMENT

This patient survived surgery and a massive gastric hæmorrhage and was slowly improving until respiratory obstruction developed. The severity of the bronchopneumonia found at autopsy and the lesions in the adrenal glands were unsuspected during life. Both may have been a product of excessive dehydration.

Two other cases were erroneously diagnosed as massive cerebral hæmorrhage and treated with prolonged hypothermia. The first patient was found at autopsy to have occlusion of the terminal portion of the right internal carotid artery with infarction of the territory of the middle and anterior cerebral artery. He showed a little improvement in the level of consciousness. In error a litre of 5% glucose in water was injected intravenously and after this his condition quickly deteriorated again and he died. The second patient made a complete recovery after three days' treatment with hypothermia, but his convalescence was complicated by an acneiform eruption and a weeping eczema of the scrotum attributed to too prolonged contact with ice bags. Investigations have failed to reveal a cause for

this man's illness, and barbiturate poisoning is suspected.

DISCUSSION

Survival of two of eight patients with fulminating spontaneous intracranial hæmorrhage is not an impressive result. However, in no case was prolonged hypothermia without influence. The progress of the pressure cone was arrested in Case 2 until the patient aspirated vomit. A transitory rise in the level of consciousness was observed in Case 3 and in the patient with carotid occlusion. The remaining six patients with a definite tentorial pressure cone showed dramatic improvement. These observations indicate that prolonged hypothermia is a most powerful method of arresting and reversing the progress of the tentorial pressure cone. A slack brain was seen on three out of four occasions when the skull was opened though the hæmatoma had yet to be evacuated, and this observation confirms the opinion that hypothermia relieves the pressure cone by reducing the brain volume. In Case 3 the brain was moderately swollen and in this patient the pupil had dilated in spite of hypothermia.

The return of power on the first day and of complete paralysis of the arm on the third day in Case 6, when the patient was warmed, is evidence of the major part progressive ischæmic necrosis plays in causing the residual disability in patients who survive massive cerebral hæmorrhage. As the brain volume increased with warming, the pressure on the internal capsule rose and ischæmic necrosis progressed. The hæmatoma should be evacuated as soon as possible if the residual disability is to be trivial.

COMPLICATIONS

1. Four patients and possibly a fifth suffered from massive gastric hæmorrhage, either during hypothermia or up to seven weeks after the onset of the illness. Case 4 suffered from epigastric pain and tenderness before hypothermia was begun and therefore this complication is most easily attributed to the small superficial ulcers secondary to brain damage of the type described by Cushing.² Such ulcers were found at autopsy in two patients who died from gastric hæmorrhage. This complication was unexpected, as gastric hæmorrhage is not commonly seen in patients with cerebral hæmorrhage. Death was

averted in later cases by blood transfusion. The value of reducing gastric acidity as a prophylactic measure remains to be explored. One patient had a severe nosebleed most easily attributed to hypertension, and another was found, at autopsy, to have a hæmorrhage into the left adrenal gland, secondary to aseptic thrombosis of the adrenal veins. No evidence of a generalized bleeding tendency has been encountered in these cases such as that reported by Virtue,⁴ and several detailed studies of blood coagulation during the hypothermic period failed to show any significant deviations from normal.

2. Mild uræmia developed in every patient, and anuria in Cases 1, 3 and 4. Evidence of tubular nephrosis has always been trivial and it is believed that this complication should not be important if the blood pressure is not allowed to remain low after warming. It will be investigated further.

3. Pneumonia was a serious complication in three patients after warming. It developed in Case 8 in spite of a tracheotomy. Pneumonia is always a serious hazard in the unconscious patient, but it is suspected that the uræmia and excessive negative water balance may increase the tendency to lung infection.

4. Two patients developed aseptic venous thrombosis, which may be attributed to the excessive negative water balance.

5. Two patients developed an acneiform eruption during convalescence and a weeping eczema of the scrotum was seen in one patient, possibly caused by too prolonged contact with ice bags.

6. Serum electrolytes have remained within normal limits except in Case 8, in which there was an alarming rise in serum potassium level on warming.

7. Various auricular arrhythmias were common, transient and harmless. To prevent cardiac complications such as ventricular fibrillation, the rectal temperature was not allowed to fall much below 30° C. (86° F.).

In all cases a negative water balance has been deliberately induced. It has been excessive in several patients and may have contributed to the complications they showed. Though it is of some value in reducing the cerebral volume it is uncertain whether it is really a useful adjunct to prolonged hypothermia.

SELECTION OF CASES

The problem of bedside diagnosis in cerebral hæmorrhage will be the subject of a later communication from one of us (D.A.H.), and will not be discussed here. Much of the evidence on which a diagnosis was made has not been included in the case abstracts. In the majority of patients an accurate diagnosis of massive cerebral hæmorrhage can be made at the bedside without lumbar puncture, a procedure which often aggravates a tentorial pressure cone to a degree which may be fatal to a moribund patient. It is not intended to treat patients with a pressure cone secondary to cerebral softening. If the lesion is so large that they are dying of cerebral swelling, grave mental and physical disablement is the inevitable result of saving their lives.

More difficult than the problem of bedside diagnosis is the problem of which case to treat. Some maintain that it is never right or proper to interfere in the course of fulminating massive cerebral hæmorrhage. Others believe that treatment should never be withheld. Cerebral hæmorrhage, like bronchopneumonia, is sometimes an old man's friend, terminating a long and distressing illness. It is a common fear of the aged that they will be so disabled mentally and physically by a stroke that they will be a burden to themselves and their families. Some hypertensive patients may have another massive hæmorrhage a few months after treatment, but how often this will happen is unknown. In the past many patients with more slowly developing cerebral hæmorrhage have been treated surgically. The majority of the survivors have not been seriously disabled and many of the hypertensive patients have lived many happy years without a recurrence. With prolonged hypothermia, similar results are possible with the more common fulminating form of the disease.

SUMMARY

1. Eight moribund patients with massive intracranial hæmorrhage have been treated with prolonged hypothermia.

2. Hypothermia influenced the course of the disease in every patient. Seven showed some improvement and two survived.

3. Gastric hæmorrhage was the most serious complication.

4. Prolonged hypothermia is a powerful method of reducing the cerebral volume and thereby relieving the acute tentorial pressure cone.

We wish to thank our colleagues, especially Dr. Harold Elliott, for much advice and encouragement.

We also wish to thank our nursing staff for their hard work, often in extreme discomfort, when the windows were opened to hasten cooling.

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ADDENDUM

Another patient has been treated since this paper was written. He suffered from intracranial hæmorrhage from a large berry aneurysm arising from the region of the anterior communicating artery. There was no evidence of an intracerebral hæmatoma in the arteriograms. He partially recovered consciousness after lying for 48 hours in full coma with fixed dilated pupils. A negative water balance was not employed in this case. Peripheral circulatory failure developed after the hypothermic period, and at autopsy he showed acute pancreatitis and ventricular hæmorrhage.

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RÉSUMÉ

Les grosses hémorragies cérébrales entraînent souvent la mort par les perturbations circulatoires qu'elles causent en déplaçant l'axe encéphalique. De plus, par un mécanisme pareil, elles provoquent de la nécrose ischémique dans les parois de leurs cavités et causent ainsi les séquelles neurologiques des malades qui survivent. Chez les hypertendus l'hématome se forme rapidement. Comme mesure palliative, il importe de réduire la masse du cerveau par l'une des trois méthodes suivantes: déshydratation, hypotension artérielle et hypothermie. Cette dernière est obtenue par l'application de sacs de glace aux aines et aux aisselles, aspersion d'alcool et évaporation, immersion dans un bain froid et administration de chlorpromazine. On doit viser à conserver la température rectale entre 30 et 32 degrés centigrades. Les auteurs rapportent une série de 8 cas d'hémorragie cérébrale où cette méthode fut employée. Deux malades survécurent. Tous furent influencés favorablement à une phase ou à une autre du traitement. On observa, au cours de l'hypothermie, une chute de la pression artérielle, une oligurie allant jusqu'à l'anurie, une régression des symptômes neurologiques et l'installation d'un état généralement favorable à l'intervention neuro-chirurgicale. Tant à l'opération qu'à l'autopsie, on remarqua que les circonvolutions montraient peu ou pas de signes de compression. Il est intéressant de noter que plusieurs malades subirent des hémorragies gastriques importantes dont quelques-uns moururent. Ces hémorragies furent attribuées à de petits ulcères superficiels de la muqueuse gastrique. Aucun trouble de la coagulation ne put être décelé. L'urémie transitoire disparut au retour à la température normale. Il en fut de même pour quelques arythmies cardiaques. Le choix des malades à qui ce traitement peut être appliqué pose certains problèmes que discutent les auteurs.

M.R.D.

BILIARY TRACT DISEASE
A REVIEW OF 369 CONSECUTIVE
SURGICAL CASES*

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THERE HAVE BEEN few fundamental changes in the diagnosis and treatment of biliary tract disease in the past ten years. During this decade, however, the path of the surgeon has been made easier and much less hazardous by recognition of and close association with internists, biochemists, and anaesthetists. Teamwork has now become essential. Great credit is due to our biochemists for increasing our knowledge of fluid therapy and electrolyte balance. We prefer to have our biochemist direct the postoperative electrolyte and fluid therapy entirely, in severe cases.

Rapid and marked improvements have been made in anaesthesia in the last few years, and the anaesthetist is now an integral part of the operative team. His preoperative assessment, in conjunction with that of the internist, is of great value. This—combined with the wide range of anaesthetics now available and administered by highly skilled personnel, recovery rooms, blood, antibiotics, and careful postoperative follow-up by our anaesthetic staff—has been, in our opinion, in no small measure responsible for our almost negligible mortality, even in the most difficult problems in biliary tract surgery.

This presentation is based upon our last 369 consecutive cases of biliary tract disease treated surgically between January 1, 1946, and December 31, 1954. The survey is limited to the gallbladder and biliary ducts, lesions of the pancreas being excluded.

SEX AND AGE INCIDENCE

In our series of 369 cases, 290 were in women and 79 in men (Table I). It will be noted that 52.1% were 50 years of age or over. Most writers report a rapid rise in mortality with advancing years. In our series we had 2 deaths, both in the group between 70 and 79.

*From the Department of Surgery, University of Manitoba. Presented at the Western Surgical Society meeting, Winnipeg, April 23, 1955.

TABLE I.

| BILIARY TRACT SURGERY A REVIEW OF 369 CONSECUTIVE PRIVATE CASES | | |
|--|-----|------|
| Patients..... | 369 | % |
| Males..... | 79 | 21.4 |
| Females..... | 290 | 78.6 |
| AGE DISTRIBUTION | | |
| 20 - 29..... | 26 | 7.0 |
| 30 - 39..... | 62 | 16.8 |
| 40 - 49..... | 89 | 24.1 |
| 50 - 59..... | 106 | 28.8 |
| 60 - 69..... | 64 | 17.4 |
| 70 - 79..... | 22 | 5.9 |

SIGNS AND SYMPTOMS (Table II)

In reviewing our records, we found that upper abdominal pain and colic were present in 318 cases (86.1%). Three hundred and fourteen patients had had previous attacks of greater or less severity, and of these, 190 (51.5%) had an associated history of nausea and vomiting. Jaundice at the time of admission, or a history of jaundice, was recorded in 67 (15.4%). One hundred and eighty-four (49.8%) complained of dyspepsia, a rather loose term applied to a wide variety of symptoms.

TABLE II.

| SIGNS AND SYMPTOMS IN 369 CASES | | |
|--------------------------------------|--------|------|
| | Number | % |
| Upper abdominal pain and colic..... | 318 | 86.1 |
| Previous attacks..... | 314 | 85.0 |
| Associated nausea and vomiting..... | 190 | 51.5 |
| Jaundice or history of jaundice..... | 67 | 15.4 |
| Dyspepsia..... | 184 | 49.8 |

GALLBLADDER VISUALIZATION (Table III)

The results of gallbladder visualization in 250 cases are recorded in Table III. The degree of visualization is arbitrarily divided into four groups—good, fair, poor, and no visualization. The table also shows the actual findings at the time of operation, compared with the radiological findings, and is partially an index of the acuity of our radiological confreres. It will be noted that 66 (26.4%) visualized well. In 50 of these (75.7%), stones were found and reported by the radiologist. At operation, 53 (80.3%) were found to have stones, an error of 4.6%.

The operative and radiological findings in cases reported as “fair” visualization were identical, 91.7% with stones.

TABLE III.

| RESULTS OF GALLBLADDER VISUALIZATION IN 250 CASES: COMPARISON WITH OPERATIVE FINDINGS | | | | | | |
|---|--------------------|------------|--------|------|-----------|------|
| Degree of visualization | No. of cases | % of total | Stones | % | No stones | % |
| Good visualization..... | 66 | 26.4 | 50 | 75.7 | 16 | 24.3 |
| | Operative findings | | 53 | 80.3 | 13 | 19.7 |
| Fair visualization..... | 36 | 14.4 | 33 | 91.7 | 3 | 8.3 |
| | Operative findings | | 33 | 91.7 | 3 | 8.3 |
| Poor visualization..... | 61 | 24.4 | 36 | 59.0 | 25 | 41.0 |
| | Operative findings | | 47 | 77.0 | 14 | 23.0 |
| No visualization..... | 87 | 34.8 | 29 | 33.0 | 58 | 66.7 |
| | Operative findings | | 70 | 80.4 | 17 | 19.6 |

Poor visualization was reported in 61 cases. Of these, 36 (59%) were reported to contain stones. At the time of operation, 47 (77%) were found to harbour gallstones.

There were 87 patients in whom the gallbladder failed to visualize. Stones were noted in 29 (33%). We routinely check any case of non-visualization if there is any question as to the diagnosis or need for surgical exploration.

It is advisable to have a policy for selecting patients for surgery in relation to the result of gallbladder visualization. It must be flexible, however. We are very hesitant to operate for biliary tract disease when the gallbladder visualizes well and no stones are seen. A dense shadow, however, will obscure stones, and one plate must always be exposed with the patient in the upright position. Not infrequently stones are found concentrated in a dependent fundus with the patient in this position, which were not visible with the patient prone. If no stones are visible, prolonged medical care is advisable, with reassessment periodically and radiography at definite intervals.

Recurrent typical gallbladder attacks, in spite of a well-visualized gallbladder, are, in our opinion, an indication for surgical exploration. Recently we have found common duct visualization by Cholegraffin very valuable. In our own x-ray department we get excellent visualization in at least 80% of cases.

As previously stated, we had 87 cases in which the gallbladder was not visualized; stones were visible in 33% of these, leaving 67% in which the decision to operate had to be made on the history and other clinical findings. Further study of these 87 cases is indicated in Table IV.

The actual lesion found at operation and reported by the pathology department is shown in Table IV. Seventy (80.4%) had stones. It will be noted that 12 cases operated upon as interval cases were reported by the pathologist to have

"acute cholecystitis", 9 with stones, 3 with no stones. It has been stated that carcinoma of the gallbladder is almost invariably associated with stones, but our 2 patients had no stones. In 3 cases no lesion was found—a diagnostic error of 3.4%.

TABLE IV.

| PATHOLOGICAL FINDINGS IN 87 CASES OF NON-VISUALIZING GALLBLADDER | | |
|---|--------|-------|
| | Number | % |
| Chronic cholecystitis with stone..... | 59 | 67.9 |
| Chronic cholecystitis (no stone)..... | 6 | 6.9 |
| Cholesterosis..... | 2 | 2.3 |
| Acute cholecystitis with stone..... | 9 | 10.4 |
| Acute cholecystitis with no stone..... | 3 | 3.4 |
| Hydrops with stone..... | 2 | 2.3 |
| Hydrops with no stone..... | 1 | 1.1 |
| Carcinoma with no stone..... | 2 | 2.3 |
| No lesion..... | 3 | 3.4 |
| | 87 | 100.0 |

INCISIONS (Table V)

We have never restricted ourselves to one type of incision. Fifteen years ago we used a Kocher incision frequently. It gives excellent exposure, and no other incision gives a clearer view of the biliary tract. Incisional hernia, however, in our hands has occurred not infrequently. A right rectus incision with lateral displacement of the rectus muscle has many points in its favour. It gives good exposure and can be enlarged to almost any extent. It is not a substitute for a routine thorough clinical examination, however, and as our experience grows, we use it less than other approaches. Postoperative herniæ, again, are not uncommon.

In the past five years we have used the formal transverse incision extensively. We believe it is a more anatomical and physiological incision, is flexible, and gives excellent exposure. It can be extended just as well as the paramedian incision.

During the past three years, we have been experimenting with a muscle-splitting approach. This is, in our opinion, merely a modification of the formal transverse incision. The rectus muscle is not divided, but is mobilized and retracted medially. The external and internal oblique and transverse muscles are split in line with their fibres and retracted. Care is taken to displace any presenting nerves upwards or downwards. The posterior sheet of the rectus is split almost to the midline. In the great majority of cases, excellent exposure is obtained. It also is a very flexible procedure, and can be converted into a formal transverse incision by dividing the rectus muscle at any time during the operation. As shown in Table V, we have been

TABLE V.

| TYPE OF INCISION IN 369 CONSECUTIVE CASES | | | | |
|---|--------|------|-------------------|----------------------|
| | Number | % | Postop. herniæ | Last 100 cases |
| Right rectus..... | 153 | 41.3 | 0 | 13 |
| Trans. muscle split.. | 107 | 29.0 | 0 | 69 |
| Trans. muscle split ext..... | 10 | 2.8 | 0 | 7 |
| Trans. incision..... | 78 | 21.2 | 3 | 11 |
| Kocher incision..... | 20 | 5.4 | 1 | 0 |
| Kidney incision..... | 1 | .3 | 0 | 0 |

forced to extend this muscle-splitting operation ten times in 117 cases. We believe that this transverse muscle-splitting operation or approach causes the patient less postoperative discomfort than any other incision we have used. To date we have had no postoperative herniæ. We usually bring a Penrose drain out of the lateral angle of the wound, and in cases where we insert a T-tube it is invariably brought out through the abdominal wall through a small stab incision in some appropriate position above the transverse incision.

We have, on occasion, used a kidney approach to the gallbladder. On rare occasions it is desirable to inspect the kidney at the time of cholecystectomy. We recommend this approach for this dual investigation. It is also useful where multiple operations have converted the anterior abdominal wall into a mass of scar tissue with dense intra-abdominal adhesions.

It is a wise surgeon who discusses the operation with his patient if possible, before the latter goes into the hospital. This is the time to tell about the value of early ambulation, why

it is done, and what complications it avoids. Deep breathing exercises can be emphasized, the reason for bandaging the legs in those with varicose veins can be explained, and fears of wound disruption on getting up early can be allayed. Usually the patient is only too eager to learn about these things and is more confident and cheerful as a result.

Nothing in gallbladder surgery is more important than how one inserts the abdominal packs. Usually three large abdominal pads suffice. The first one controls the stomach, the second walls off and displaces the colon downwards, and the third controls the duodenum. When they are placed properly and retracted downwards and medially, the common duct is put on the stretch and in most cases runs more or less transversely—a point to be remembered, because it resembles a large cystic duct. In this manner the entire field is visualized, and rarely does a retractor need to be shifted throughout the operation. This unquestionably lessens shock and also reduces operation time to 30 to 40 minutes.

Hospitalization for at least 48 hours preoperatively is an absolute rule in our clinic. To admit a patient in the afternoon and operate the following morning is, in our opinion, to court disaster. Married women in particular need 48 hours or longer, as they invariably enter the hospital very tired and appreciate the fact after resting at least two days preoperatively. During this time, fluid balance is carefully checked, the colon is emptied, and they become acquainted with their surroundings and relax.

As a result of this 2-day regimen, gastric suction postoperatively is a rare event and enemas are almost entirely avoided, with great benefit and comfort to the patient.

OPERATIVE PROCEDURES

The operative procedures carried out in our 369 consecutive cases are shown in Table VI. Simple cholecystectomy was performed in 267 cases, with no mortality. Our routine procedure is a meticulous dissection of the biliary tree from below upwards. The common duct must be visualized well above and below the junction with the cystic duct before any clamp is applied. This is an absolute rule. Usually the cystic artery and cystic duct are clamped and ligated separately.

TABLE VI.

| OPERATIVE PROCEDURES IN 369 CASES | | | | |
|--|--------|--|-------|--------|
| | Number | Chronic | Acute | Deaths |
| Cholecystectomy | 262 | 223 | 39 | 0 |
| Removal of cystic duct stone | 1 | | | 1 |
| Cholecystectomy and exploration of common duct or common duct exploration only | 96 | Stones found in 35 (9.7%) | | 0 |
| Excision of gallbladder and common duct and end-to-end anastomosis | 2 | For ca. common duct | | 0 |
| Excision common duct and choledochoduodenostomy | 2 | For ca. common duct | | 0 |
| Choledochoduodenostomy | 2 | For stricture | | 0 |
| Sphincterotomy | 1 | For biliary dyskinesia | | 0 |
| Exploration only | 2 | For carcinoma | | 0 |
| Gastroenterostomy | 1 | For carcinoma of gallbladder involving pylorus | | 1 |
| | 369 | | | 2 |

Acutely inflamed gallbladders are usually removed from above downwards. The peritoneum is incised around the fundus of the gallbladder and mobilization from above downwards carried out carefully until the cystic duct and artery are isolated. The cystic duct is traced to its junction with the common duct and the latter is then carefully defined for at least 1/2 to 1 inch (1.25-2.5 cm.) above and below. It is explored, if deemed advisable, at this time. A forceps on Hartmann's pouch makes an excellent retractor and fixes the common duct, making exploration very easy. The cystic duct and artery are now clamped and we doubly ligate both. If the common duct has been explored, a single suture or ligature on the cystic duct stump is sufficient, as the duct is decompressed. The cystic duct should be ligated approximately 1/4 inch from the common duct. To leave 1/2 inch as recommended by some authors, in our opinion, favours formation of stone in the remnant.

The common duct was explored in 96 (26%) of our cases. Stones were found in 35 (36.4%) of ducts actually opened. This represents 9.7% of our total series and, judging from reports in the literature, we should be exploring a greater number. We aspirate a great percentage of ducts, but if the bile is clear, no stones are palpable and the duct of normal size, we hesitate to carry the exploration further, in spite of the knowledge that common duct exploration has not increased our mortality. In 5 cases we have clinical evidence suggesting a missed common duct stone. No deaths occurred in these 96 cases.

MORTALITY

In one case we removed a stone from a remnant of cystic duct. The stone was 1/2 inch in

diameter and was causing severe colic. A T-tube was inserted and drainage instituted. The patient was an old woman with severe asthma, and she died 18 hours after operation. Autopsy revealed no definite reason for death.

Our second death occurred in an elderly patient admitted with pyloric obstruction, marked loss of weight, and dehydration, severe anaemia, constant nausea, vomiting and jaundice. There was a palpable mass in the epigastrium. Pre-operative treatment was instituted and carried on for seven days. At laparotomy, a carcinoma of the gallbladder, involving the pylorus, was found. A posterior gastroenterostomy was done and the abdomen closed. The patient died on the second day. It is questionable whether this case should be included, as no operation on the biliary tract was performed.

TABLE VII.

| PATHOLOGICAL REPORTS | | |
|-----------------------------------|--------|------|
| | Number | % |
| Chronic cholecystitis | 283 | 76.9 |
| Acute cholecystitis | 48 | 13.0 |
| Gall stones (gallbladder) | 286 | 77.7 |
| Common duct stones | 35 | 9.7 |
| Cholesterolosis | 34 | 9.2 |
| Hydrops | 6 | 1.6 |
| Empyema | 3 | 0.8 |
| Malignant tumour | 7 | 1.9 |
| Normal (no pathology) with stones | 5 | 1.3 |
| no stones | 13 | 3.5 |

PATHOLOGICAL FINDINGS

Table VII records the pathological lesions found by the Pathology Department in our cases. In our total series, 286 cases (77.7%) had stones in the gallbladder. Forty-eight cases of acute cholecystitis were operated upon, with no deaths.

TABLE VIII.

| POSTOPERATIVE COMPLICATIONS | | | | | | |
|---------------------------------|-----|-------|------------------------------|------------|---------------------|------|
| | No. | % | Medical | Aspiration | Trocar and catheter | Open |
| Subphrenic abscess..... | 15 | 4.1 | 10 | 1 | 1 | 3 |
| Pulmonary complications..... | 15 | 4.1 | —Atelectasis 11 —Emboli 4 | | | |
| Gross wound infection..... | 6 | 1.6 | | | | |
| Thrombophlebitis..... | 6 | 1.6 | | | | |
| Postoperative herniae..... | 4 | 1.0 | | | | |
| Psychoses..... | 3 | 0.8 | | | | |
| Wound disruptions..... | 0 | 0.0 | | | | |
| Incidence of complications..... | 49 | 13.2% | | | | |

Seven cases of malignant tumour (1.9%) were encountered—one in the hepatic duct, 3 in the common duct, one in the gallbladder and common duct (separate lesions), and 2 in the gallbladder only. All were treated by radical local excision, but no Whipple procedures were done in the series.

In our total series of 369 cases, 13 were found with no evidence of lesions, a diagnostic and operative error of 3.5%.

POSTOPERATIVE COMPLICATIONS (Table VIII)

One of our most common complications was an accumulation of fluid under the liver or diaphragm. All are reported as subphrenic abscesses. In only 3 cases out of 15 was it necessary to resort to open drainage. Ten were treated medically by antibiotics, one by aspiration, and in one a drain was inserted into the subdiaphragmatic space through a large cannula and trocar. No deaths occurred in these 15 cases.

Pulmonary complications were recorded in 15 cases—11 cases of atelectasis and 4 cases diagnosed as pulmonary emboli. No deaths occurred. We have had no wound disruptions. For most paramedian incisions and in all transverse incisions where the rectus muscle is cut across, we use wire tension sutures down to the peritoneum. In muscle-splitting operations, we close the incision with chromic catgut and silk. If the incision is extended to involve the rectus muscle, we invariably use deep wire tension sutures.

In 64 cases the abdomen was closed without drainage. In only two were complications recorded, one a pulmonary embolism and one a severe superficial wound infection. We are convinced that the convalescence in these 64 cases was smoother than in cases in which drainage

was instituted. We do not recommend omission of drainage, but it can be omitted in some cases with safety, by those who do a meticulous dissection in a dry field, with advantage to their patients.

FOLLOW-UP (Table IX)

Two hundred and twenty-two cases have been followed up for not less than one year; 168 patients are symptom-free, 46 have dyspepsia of greater or lesser degree, and of these latter, 3 have hiatus hernia, 2 duodenal diverticula and 2 duodenal ulcer. Eight complained definitely of abdominal pain diagnosed as due to dyskinesia in 2 cases and to definite pancreatitis in 1, while

TABLE IX.

| 222 FOLLOW-UP REPORTS ONE YEAR OR MORE POSTOPERATIVELY | | | |
|---|-----|--------------------|----|
| 1. No gastrointestinal complaints..... | 168 | | |
| 2. Dyspepsia..... | 46 | Hiatus hernia | 3 |
| | | Duod. diverticulum | 2 |
| | | Duod. ulcer | 2 |
| 3. Pain..... | 8 | Dyskinesia | 2 |
| | | Pancreatitis | 1 |
| | | Stone | 5? |

in 5 there is a suggestion of stones in the common duct. The 2 cases diagnosed as biliary dyskinesia have been reinvestigated; no stones were found on intravenous cholangiography, but the common ducts are large and drain poorly. Sphincterotomy has been done on both cases in the last few months. In one case external and in one internal drainage was instituted.

SUMMARY

1. A report on 369 cases of biliary tract disease treated surgically is presented, together with x-ray findings, pathological reports, surgical approach, complications, and end results.

2. The over-all mortality in all cases was 0.54%.

3. In 262 cases cholecystectomy only, and in 96 cases cholecystectomy and common duct exploration, were carried out consecutively without a death.

4. Six cases had excision of the common duct, with some form of plastic anastomosis, without mortality.

5. No surgery on the biliary tract was carried out with less than 48 hours of preoperative care in hospital, except in some cases of acute cholecystitis. In these, a minimum of 24 hours for investigation and preparation is essential.

6. The value of team-work between the surgeon, internist, biochemist, and anaesthetist is stressed.

RÉSUMÉ

Cet article traite d'une série de 369 cas d'affections des voies biliaires traités par la chirurgie. La moitié

d'entre eux dépassaient la cinquantaine, et les femmes étaient à peu près trois fois et demie plus nombreuses que les hommes. La grande majorité se présentèrent pour douleurs et coliques de la région supérieure de l'abdomen. Environ la moitié accusaient de la nausée et des vomissements. Des 250 malades chez qui fut pratiquée la cholécystographie, la vésicule ne fut bien vue que dans 26.4% des cas. On rapporta des calculs dans 50 de ces cas, mais cependant on en trouva à l'opération chez 53 malades (erreur de 4.6%). Les auteurs sont d'avis qu'en face d'attaques typiques et répétées de cholécystite, il est bon d'explorer même si la radiographie est normale. Trente-trois pour cent des 87 cas chez qui on ne pouvait apercevoir la vésicule montraient quand même des calculs à la radiographie. Les auteurs ont essayé la plupart des incisions employées dans cette intervention, y compris la voie rénale. L'application judicieuse des écarteurs (un pour l'estomac, un autre pour le colon, un troisième pour le duodénum) dès le début de l'intervention diminue le choc post-opératoire et permet de compléter l'opération en 30 à 40 minutes. On insiste sur une hospitalisation pré-opératoire d'au moins 48 heures. Une dissection méticuleuse doit toujours être pratiquée, et les vésicules en état d'inflammation aiguë sont habituellement enlevées de haut en bas. L'exploration du cholédoque fut faite dans 26% des cas; des calculs furent découverts chez 35 malades. Les deux seuls décès se limitent à une vieille femme asthmatique et à un vieillard en occlusion pylorique causée par un carcinome de la vésicule biliaire. La complication post-opératoire la plus fréquente fut l'abcès sous-phrénique. L'atélectasie et l'embolie pulmonaire vinrent en second lieu. Deux cent vingt-deux malades furent suivis pendant un an et plus; cent soixante-huit d'entre eux se portent bien, quarante-six accusent des dyspepsies plus ou moins intenses.

M.R.D.

TRAUMATIC LARYNGOTRACHEAL INJURY*

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TRAUMATIC DAMAGE to the larynx and cervical trachea has always been considered to be of rare occurrence. The mobility of these structures and the elasticity of their cartilage framework are protective mechanisms. The mandible also acts as a bony buttress to divert or absorb direct blows which might otherwise be serious. It is indeed fortunate that such conditions exist because the respiratory life line is most fragile at this point. Injury to the laryngeal cartilages or the trachea, resulting in reactionary oedema or the aspirations of blood and/or secretions, may rapidly promote a crisis, overcome only by an

emergency tracheotomy. The surgeon who carries out such a life-saving procedure when needed, under difficult and usually desperate conditions and without adequate instruments, is to be commended most highly. Not only has his skill been of high order, but his diagnostic acumen is considerable.

In recent years, with the ever-increasing flow of traffic, such injuries have become by no means uncommon, and a discussion of the problems involved, both immediate and long term, therefore seems timely. The immediate symptoms of laryngotracheal damage are, of course, hoarseness and dyspnoea. The degree of dyspnoea must guide the observer in his decision to tracheotomize or not. Associated with these symptoms may be hæmoptysis, swelling of the neck due to hæmatoma or emphysema, and lacerations of various kinds. There may be only hæmoptysis and dyspnoea, even in the presence of severe injury.

Of great importance is the early management of the case. Of primary interest is, of course, the

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maintenance of an adequate airway. If it is suspected that a tracheotomy might be needed, it should be done at once. Adequate measures must also be taken to combat shock and hæmorrhage. After these first-aid measures, it is necessary to immediately and accurately assess the damage done. This will require direct and indirect endoscopic examination and the use of x-rays. Fractures may be reduced, lacerations closed, and adequate support given to prevent later loss of function and stenotic narrowing of the all-important airway. Failure to accurately assess and adequately deal with the injury at the onset will necessitate the subsequent mobilization of scar, and correction of deformity and stenosis, with considerable loss of time and opportunity. Indeed, it will be necessary later to reproduce almost exactly those conditions which existed at the time of injury.

Injuries to the larynx and cervical trachea may be grouped together. External lacerations with fracture of, or damage to, the cartilaginous framework must be handled by early suture and repair, and the treatment of possible infection. Perichondritis is a stubborn and difficult condition to deal with, and may result in considerable deformity if not treated energetically. Damaged cartilage must be removed during the initial debridement and adequate chemotherapy should be given. Under such conditions, perichondritis is unlikely.

Injuries resulting in tears of the respiratory membrane present an entirely different and infinitely more difficult problem. The complicating factor here is the great tendency for scar formation which may, in the case of the vocal cords, limit or prohibit movement; or in the subglottic area or trachea, cause stenosis or atresia of the lumen. Loss of the respiratory lumen may occur in conjunction with loss of the all-important cartilaginous framework, which is essential for the satisfactory restoration of the lumen. No substitute has yet been found for this natural support.

Whether the efforts to repair damage to the respiratory membrane alone or to the respiratory membrane and accompanying cartilaginous support be undertaken early or late, the problems and techniques are similar. Not only has the increasing frequency of automobile accidents stimulated interest in this area, but the march of progress in chest surgery has demanded the development of techniques for the repair of the

trachea and bronchi to allow for more extensive resections. A great deal of recent experimental work has been done with dogs in the repair of tracheal and bronchial defects of various types and extent, using a wide variety of materials, grafts, and prostheses.

From a review of the literature, it would appear that minor defects in the tracheal wall, without loss of the cartilaginous framework, may be satisfactorily repaired in several ways. Homografts of bronchial wall, if available, are very satisfactory. Failing this, dermal grafts reinforced by wire, and fascia or pleura reinforced by tantalum or steel mesh, have been successfully used. It is also of great interest to see that, when such grafts are used, they tend to be covered by the ingrowth of respiratory epithelium from the sides of the defect. This epithelium is ciliated and may contain some glands. This is true in all cases except where a skin graft is used. In these cases, there are usually islands of squamous epithelium. Such evidence would seem to indicate that skin grafting to denuded areas of the respiratory tract is not only unnecessary, but is probably actually harmful. It has also been shown that cartilaginous elements of the tracheal wall tend to regenerate, but in no case has this been sufficient to be of significant support.

It is in the case in which the tracheal defect is too great to be bridged by direct anastomosis or in which the supporting cartilage framework is lost that the greatest difficulty is encountered. In such cases, it is necessary either to employ an inlying tubular prosthesis, and to support the fibrous wall formed about the prosthesis by wire or tantalum mesh, on which fascia has been grafted, or to use a dermal graft reinforced by wire. The only successful result in a large tracheal defect was reported when tantalum mesh covered by a fascial graft was used. Polyethylene has been utilized for the tubular prosthesis. Generally speaking, the great drawback to the use of a tubular prosthesis alone has been the universal and irresistible tendency for the trachea to stenose after removal of the tube. As a result, some external support must still be supplied. Much work is still being done on this problem. An encouraging feature is the apparently non-irritating nature of polyethylene. In the author's experience and in many others', such a prosthesis can be left almost indefinitely .

in the cervical trachea without causing irritation or retention of secretions.

The tendency to scar formation and stenosis is equally seen in the larynx, both in the subglottic area supported by the thyroid cartilage and the cricoid cartilage, and in the region of the vocal cords where anterior or posterior bands may restrict the airway and impair the mobility of the cords themselves. Such web formations may simulate the syndrome of recurrent laryngeal nerve damage, and so confuse the picture.

The problem of laryngeal stenosis, referring to scarring within the cartilaginous box of the larynx itself, has been the object of study by laryngeal surgeons for many years. In the light of present-day knowledge and research, it is of interest to note that in the Semon Lecture of 1938 Professor E. Schmiegelow of Copenhagen reported the successful handling of 18 cases of chronic laryngeal stenosis over the preceding 15 years by the method of laryngofissure, excision of scar, and sewing into the trachea of an open rubber tube, which he left in place for approximately eight months. This tube was kept in position by a stainless steel wire which did not extend beyond the skin and was not tied. As a result, at the end of eight months, the tube and wire could be withdrawn endoscopically from above. It is to his credit, also, that at the time of the original laryngofissure, he removed the tracheotomy tube. Thus was described a successful one-stage method of treatment of these strictures, which provided the patient with immediate airway and an eventually adequate tracheal lumen, lined by respiratory epithelium.

Despite this work, there followed an era which has continued to the present time, in which a split-thickness skin graft was used to cover the denuded area left after the excision of tracheal or laryngeal scar. The skin graft was held in place by means of a sponge-rubber prosthesis about which it was sewn, for a period of ten days. The sponge rubber was then removed, and replaced by a rigid, solid stent prosthesis which was left in place for six to eight months, in order to prevent stenosis of the lumen from the scar and from the graft. Following this, the very large tracheal opening was closed by a plastic procedure, usually requiring the forming of a skin tube. Thus a three-stage procedure was advocated, which deprived the patient of an airway until the finish of the last stage, and left him with, at best, a skin-lined trachea.

It would appear that the method of Professor Schmiegelow is supported by recent experimental findings, and that it has every advantage over the cumbersome three-stage method which superseded it.

In cases such as one of the two reported below, damage to the recurrent laryngeal nerves is quite likely. When this occurs, the damage to the airway will be complicated by an abductor cord palsy, which may in itself provide sufficient obstruction to require a tracheotomy. The degree of involvement of the nerves will, of course, vary, as will the duration of the paralysis. When permanent damage is done, and this probably occurs in the area of the crico-thyroid joint, surgical intervention will be necessary to provide adequate airway. The patient usually is able to carry on while at rest, but any additional effort will result in dyspnoea, and there is usually difficulty in breathing at night. The voice may be quite good, and the surgical procedure must attempt to balance airway and voice so that each will be adequate.

In 1938, Hoover advocated submucous resection of the vocal cord in such cases. This procedure, done through a laryngofissure, usually provided adequate airway but resulted in a poor voice. Although the voice is of course a secondary consideration, nevertheless it becomes an increasingly important factor to the patient, who soon forgets the difficulty he once had in breathing. In 1939, King devised an operation in which the omohyoid muscle was used in an attempt to retract the cord for respiration and to establish some function of the cord for phonation. Kelly modified this arytenoidectomy by working through a window cut in the thyroid cartilage. Woodman and Orten both devised modifications of this basic operation in order to facilitate the lateral rotation of the arytenoid cartilage, and thereby the vocal process and vocal cord. Thornell has recently proposed an endoscopic method of arytenoidectomy with cautery of the subepithelial tissues. The latter method is much more simple and direct than any of the former, and in Thornell's hands has given good results. The chief technical difficulty in these operations is to determine the extent to which the vocal cord should be lateralized in order to achieve the purpose of the operation and still maintain a functional voice. It is particularly difficult to judge this at operation because of the extensive laryngeal oedema usually produced at this stage

of the operation. Experience would seem to be the only teacher in this particular field. The essential feature of the operation is to obtain adequate exposure of the superior border of the cricoid cartilage, and thus find and dissect free the arytenoid cartilage. This cartilage will rotate and slide laterally on its saddle-like articular facet, thus carrying the posterior third of the vocal cord laterally. Fixation in this position will provide an adequate posterior laryngeal chink. Thus, the cord is lateralized without tear of the lining respiratory epithelium, with the usual resulting scarring and stenosis.

In those cases in which operation on one side fails to provide adequate airway, the other side may be operated upon. On the other hand, if too much airway is produced at the expense of the voice, there is little that can be done to rectify the situation. It is better, then, to err on the side of conservatism. Woodman has also described a method by which further lateralization may be obtained for those cases in which the standard procedure has failed. He advises a laryngofissure and a submucous resection of one cord. The mucous membrane is then fastened back on its bed by catgut sutures which pass through the thyroid ala on that side and are tied laterally. This enables the degree of lateralization to be determined under direct vision. Woodman warns against excision of muscle in this procedure.

Other methods have been advocated, including that of Washington, who separates the thyroid alae anteriorly and holds them apart by suturing the strap muscles between the anterior borders. This procedure, in my experience, is likely to produce anterior granulations and scarring which tends to defeat the purpose.

Another problem seen occasionally, as the result of traumatic damage to the larynx, is that of the anterior web, which fixes the vocal cords and reduces the glottic chink. This entity results from destruction of the epithelium in the anterior angle of the larynx; as a result, fibrin strands bridge the gap and eventually sew the edges together, advancing posteriorly as healing progresses. Unopposed, this bridging will continue until the anterior two-thirds of the larynx is closed off. This problem is also encountered as a result of surgery which denudes both cords into the anterior commissure.

Previously, this problem was handled by repeated bouginage, or by laryngofissure with

excision of the scar and subsequent skin graft. After the skin grafting, an obturator must be worn until scar retraction has subsided. Various authors have advocated various methods with a wide variety of substances and metals. None of these methods was universally successful. Haslinger devised a method whereby a silver plate was fastened between the denuded cords after the web had been incised. This was kept in place by a wire through the thyroid cartilage at the anterior commissure, and fastened to a button on the skin surface. The method was of value, but the discrepancy between the movement of the skin and the larynx caused perichondritis and displacement of the plate.

Iglauer, in 1935, proposed the principle which led to proper management of these webs. He reasoned that, as the formation begins at the apex, a successful conclusion could be obtained if an epithelialized tract were established at the apex and a subsequent incision then carried out to the free edge. Such a tract could be established by leaving a suture in this position at the anterior commissure, or a metal ring. The difficulty is that in most cases the laryngeal web, though thin at the posterior edge, has considerable depth anteriorly and this makes such a procedure difficult.

McNaught, in 1950, described his tantalum keel operation, which is the most successful method yet devised for handling the web problem. He inserts a thin plate of tantalum in the mid-sagittal plane of the larynx through a slot in the thyroid cartilage, made via an external incision. This plate interposes between the vocal cords and is left in place for two months, at which time epithelium has grown over the raw surfaces and the keel may be removed. In my experience with this procedure, the results have been good. There has been universal disappointment with the quality of the voice resulting, but I believe that this will improve steadily over a period of two or three years.

Posterior laryngeal webs do not occur, I believe, while the arytenoids are moving. However, if there should be paralysis of the vocal cords with a posterior tear of the laryngeal mucosa, such a web might develop. This is illustrated in one of the case reports below. In such a case, the problem is much more difficult and an obturator may be necessary.

My interest in the above problems was stimulated by seeing two cases recently which were

the result of automobile accidents. They are reported below.

CASE REPORTS

CASE 1

The patient, F.J., a 30-year-old white man, was involved in an automobile accident on July 1, 1954. At the time, he developed considerable emphysema of the neck and hæmoptysis. There was, however, no break in the skin. Severe dyspnoea developed shortly after the accident, and a tracheotomy was required. He was seen by us six weeks after the accident, at which time he was unable to breathe except through his tracheotomy tube, and he was unable of course to speak.

Palpation of his neck at this time failed to reveal any significant abnormality in the tracheal or thyroid region. Mirror examination of the larynx demonstrated cords lying almost in the midline without movement. A direct laryngoscopy was carried out, and about one-half to three-quarters of an inch subglottically, a complete fibrous stenosis of the trachea was seen (Fig. 1.).



Fig. 1.—Condition after tracheotomy. Note complete fibrous stenosis of trachea near laryngotracheal junction.

On August 3, under general anaesthesia, a laryngofissure was carried out, and the trachea and the scarred portion of the larynx were examined. It was seen that the original injury was a tear of the cricotracheal membrane with resulting stenosis in this area and complete atresia of the trachea. The first two rings of the trachea were pushed distally by the injury and the subsequent scarring. The cricoid cartilage itself was intact, but the stenosis involved its lumen. At this operation the trachea was opened, the scar excised, and a polyethylene tube of proper size to fit the cricoid ring snugly was inserted (Fig. 2). This tube extended from the immediate subglottic area, distally to the level of the third tracheal ring. The scarred tracheal wall was freed and sutured back into place in front of the polyethylene tube. This still

left an anterior defect of about 1 cm. square, which was left to fill in by scar. The tube was sewn in by braided tantalum wire which was brought out through the skin on each side in a mattress suture and turned about a gauze pad. On the first postoperative day, the patient was able to breathe freely through his larynx and trachea, and able to talk in a loud whisper, and this subsequently became a perfectly adequate voice. This restitution of function was a great psychological assistance to the patient, as he had previously been seriously depressed.

In a day or two, the tantalum wire which was tied about the gauze pad broke, and the ends of the wire had to be tied separately round the back of the neck by an ordinary tape. On September 30, the patient was readmitted because this suture had again broken underneath the skin. On October 1, the larynx was opened anteriorly again and a further tantalum suture inserted through the tube. After this procedure, the patient was quite comfortable until about the middle of November, at which time he began to cough violently. As a result, he was readmitted and an endoscopic examination carried out. The tube was seen to have slipped down and was lying at the main carina. The area of the previous stric-

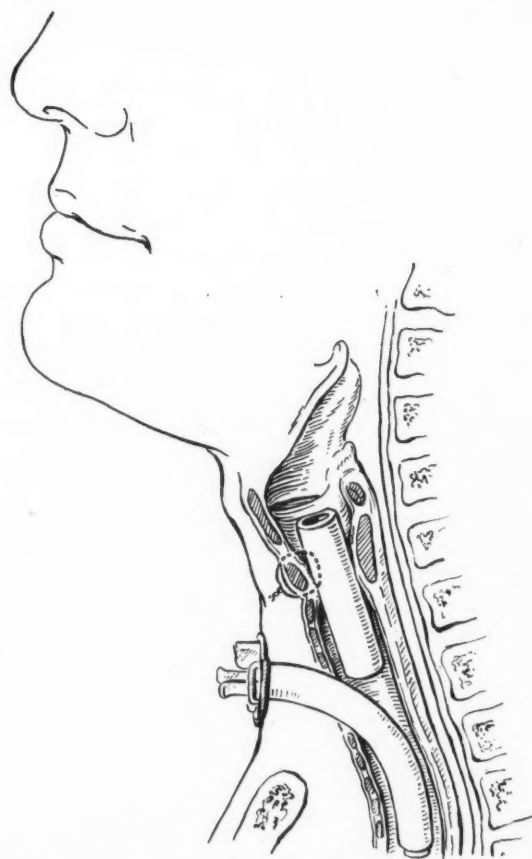


Fig. 2.—Condition after operation on August 31, 1954. Scar in trachea excised. Polyethylene tube inserted through cricoid ring and secured by suture.

ture had narrowed to the point that a No. 7 bronchoscope was passed through it with difficulty, and some granulations were still present. As a result, on November 26, a laryngofissure was again carried out, and more scar was excised, and the tube was re-sutured into position with stainless steel heavy wire. Two mattress sutures were passed through the tube and fixed to the cricoid cartilage and to the side wall of the trachea.

After this procedure, the patient was quite well and was able to be discharged from hospital. He was readmitted in January, and on January 11, under general anaesthesia, a Woodman procedure was carried out on the right arytenoid cartilage, which was freed and pulled laterally by a suture connecting it and the ala of the

thyroid cartilage. A small Penrose drain was inserted and the incision was closed in the usual manner. However, after this operation, he developed a large haematoma on the side of his neck, involving also the larynx and the arytenoid area. This required some time to subside, but did so without significantly affecting the operative result. After this procedure, the patient's airway was improved, but was still not quite adequate. It was felt, however, that the prosthetic tube was reducing the airway considerably by being in its immediately subglottic position (Fig. 3). Therefore, no further attempt was

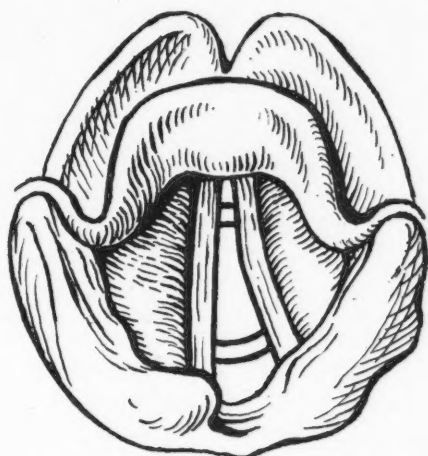


Fig. 3.—Condition after operation on January 11, 1955. Larynx seen from above. Polyethylene tube is seen through glottis.

made to increase the glottic chink at this time. On March 15, under general anaesthesia again, the wires were cut by an anterior approach and then the tube was removed endoscopically from above without disturbing the trachea.

After the removal of the plastic tube, the patient's airway and voice improved considerably. He was therefore discharged from hospital. Two weeks after operation and again six weeks after operation, this patient was again examined endoscopically and the strictured area showed some reduction in lumen, but was still quite adequate. It was felt reasonable to suppose that the stenotic narrowing of the trachea had now ceased. The glottic chink appeared adequate for all normal conditions and his voice was also satisfactory, both to him and to us.

CASE 2

The second patient, A.B., was injured in an automobile accident on March 20, 1954. At the time of injury, Mr. B. was thrown violently forward, receiving a severe blow to the front of his neck and head. As a result, he had great difficulty in breathing, and an emergency tracheotomy was necessary. He states that after his injury he spat up a considerable amount of bright red blood. There was no particular swelling in his neck, however.

Five weeks later, this patient was first seen by me; at this time, he was wearing a tracheotomy tube and was unable to breathe if this tube was obstructed. On mirror examination of the larynx, both vocal cords were seen to be fixed in the midline with very little chink of any kind visible between them. No other abnormality of the larynx or the ear, nose, and throat could be seen at this examination.

On May 26, there was no suggestion of recovery of any kind. The patient was admitted to hospital and a right arytenoidectomy was done, according to the DeGrauf-Woodman procedure. During this procedure, it was impossible to obtain proper movement of the right arytenoid, and therefore the arytenoid was removed with the hope that later scarring and retraction would assist in providing the airway. However, insufficient airway

was obtained and, in fact, there was no apparent change in the position of the right vocal cord.

As a result, on October 2, a laryngofissure was carried out and the larynx examined directly. It was found that there was a small posterior subglottic adhesion tying together the two vocal processes of the arytenoids, and preventing their movement. This adhesion was incised and a tantalum-keel operation was carried out so that the tantalum plate interposed between the raw surfaces posteriorly. A secondary Woodman procedure was also done on the right vocal cord, in which a submucous resection of that vocal cord was associated with the suturing of the cord laterally to the thyroid ala.

The result of this procedure was still not satisfactory, and it was decided to adopt a further method as suggested by Dr. Washington of Winnipeg, whereby the necessary airway is provided by the use of a wedge which separates the anterior extremities of the vocal cords. A further laryngofissure was therefore carried out and the tantalum plate removed. A wedge of tantalum was devised and placed between the alae of the thyroid anteriorly, superior to the vocal cords. The result of this procedure was satisfactory in every way. The patient's airway was very good and his voice remained satisfactory.

Unfortunately, as a result of this procedure, a fistula developed from the tantalum plate to the front of the neck, and on March 2, 1955, this plate had to be removed and the infected area drained. Nevertheless, it was felt at this time that sufficient scarring had taken place to hold the vocal cords in a position which he finds satisfactory.

This has been the case, and the patient is at present in good condition and has a satisfactory airway and voice. This case is interesting in that it presents an entirely new problem of a posterior adhesion joining the two vocal processes to the arytenoids. This adhesion would probably not have occurred had there been movement in the larynx but, once having formed, it prevented the satisfactory lateralization of the arytenoid cartilages. It also served to illustrate many of the operative procedures which are feasible for the treatment of bilateral abductor paralysis of the larynx.

I wish to express my appreciation to Dr. L. G. Polymenakos, and Dr. George C. Snell and Dr. Douglas Snell, for permission to use their cases in this report.

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OBSERVATIONS ON THE
TREATMENT OF THE
ACUTE ALCOHOLICA. M. PARK, M.D., F.R.C.P.[C.],†
With the assistance of S. F. BEDWELL, M.D.,
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IN 1949, the Province of Ontario established the Alcoholism Research Foundation for the study of the problem of alcoholism within its area and for the treatment of suitable subjects from the various communities. At present a number of out-patient clinics are operated under its direction. In some centres, patients selected by the clinic are referred for admission to local general hospitals for the immediate treatment of the acute alcoholic or withdrawal state. In Toronto, the Foundation also maintains a small convalescent hospital for aftercare of such subjects.

This report is based on experiences with patients admitted through the Foundation to the Toronto Western Hospital, for early treatment in the acute phases of alcoholism. We shall present some clinical observations on the use of insulin in therapy, and some more detailed studies on the biochemical and metabolic aspects of this early period.

BACKGROUND

While many types of therapy for this state are available, we have limited our method for this study to the use of insulin, regular type, given rapidly intravenously in variable doses, mixed with 50 c.c. of a 50% solution of glucose. This has the advantage of cheapness, safety and, as will be shown, effectiveness. With an adequately trained staff available, it is a relatively simple regimen.

This type of therapy is certainly not new, having originally been reported upon in Europe by Klemperer in 1928, in connection at first with morphine withdrawal states, but also in the treatment of acute alcoholic confusional states. For a time in the 1930's, the use of insulin was reported more extensively in connection with other psychotic disorders, but in the 1940's, reports of its further use in the treatment of the acute

alcoholic states became more frequent and its effectiveness is still unquestioned.

While there is little doubt of its usefulness, the means by which it acts are not too clear. It has not been proven that it "speeds up" the metabolism of alcohol in the body. Its sobering effect may result from its enforcement of the utilization of glucose by various body systems instead of the circulating alcohol, or it may help to rapidly redirect enzyme systems perverted in their normal functions by a steady environment of alcohol. This is all speculative as yet.

Many patients present themselves for treatment no longer intoxicated, but in the early withdrawal state. The question of the action of insulin on the metabolism of alcohol is not now pertinent.

For some years, investigators, particularly in the U.S.A., have interested themselves in the endocrinology of alcoholism. Alcohol is known to suppress the function of the posterior pituitary lobe, leading to defective tubular reabsorption of water in the kidney and a resultant diuresis. Some believe too that it also has an action on the anterior pituitary complex, and a further more direct action on the adrenal cortex. This is felt by some not only to be the result of alcoholism, but perhaps to have some relation to cause.

The profound nutritional defects so common in the history of the alcoholic while drinking have also been felt to influence metabolism in other ways, through disturbance of liver function, vitamin absorption and utilization, salt intake, protein depletion and so forth. Unfortunately, the reports of biochemical studies in this state are rather confusing, inconsistent and incomplete, and the relation of biochemical findings, if any, to the condition of the patient has not as yet been settled.

Having available a group of eligible patients, and the facilities of a modern general hospital laboratory at our disposal, it was decided to carry out a number of investigations in this group of subjects on a day-to-day basis, to form an opinion of our own as to whether any valid changes in basic body economy existed. If so, could they be correlated with the clinical state of the patient? Knowing the expected response to treatment, we could also see whether any detected changes here would mirror the clinical improvement of the patient. Such a pilot study might also suggest investigations along other

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lines, and might aid us in determining more appropriate therapy.

MATERIAL

The subjects of our study were confirmed alcoholics, many of them of several years' standing. A period of continuous heavy drinking of many days' to many months' duration preceded admission to hospital. During this period the dietary intake was virtually nil, and except for alcohol no adequate caloric supply and no accessory food factors could possibly have been obtained.

Underlying physical disease was not a feature in any case, and the known medical complications of alcoholism, such as polyneuritis, cirrhosis or encephalopathy, were not seen. While nausea and anorexia were common symptoms, frank vomiting and diarrhoea were not prominent.

It must be appreciated that these patients were expected to pay their own way in hospital, and could be kept in hospital only as long as their physical condition warranted it. Because of this, some of the studies originally planned could not be adequately completed. We had to concentrate on obtaining as many data as possible in a few days.

METHODS

In the series of 30 patients studied, a large blood sample was withdrawn before the institution of any treatment. It was divided up for electrolyte studies and other examinations, including a determination of blood alcohol.

The insulin was then given, in doses of from 40 to 90 units in 50 c.c. of 50% glucose solution into the vein. The first 10 patients also received 2 c.c. of an injectable vitamin preparation, but this was discontinued when some serious untoward reactions to it were reported. Its omission did not seem to alter the response to treatment.

Following this, blood samples were taken at half-hourly intervals for glucose estimations until the reaction to the insulin was terminated.

On the patient's second and third days in hospital many of these determinations were repeated. Urine specimens were also collected for study.

As close a clinical assessment as possible was made of each patient with respect to sleep, tension, tremulousness, appetite and subjective sense of well-being. Day-time and night-time

records were kept for correlation with the biochemical and other data.

RESULTS

(a) *The effects of insulin therapy.*

In discussing results, observations on the insulin reaction and the clinical course of the patients will be dealt with first.

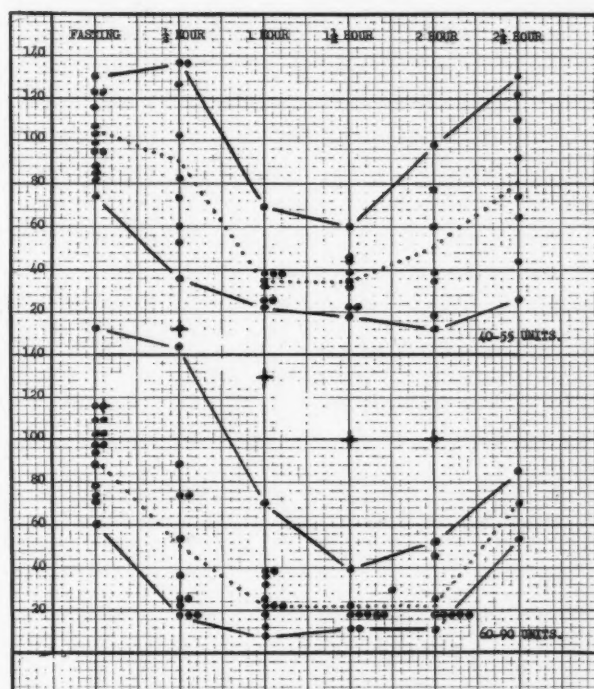


Fig. 1.—Blood glucose levels during therapy. Above, with 40 to 55 units, below with 60 to 90 units. The points indicate individual estimations.

Fourteen patients received 40 to 55 units of insulin, and the blood sugar responses can be seen in the upper part of Fig. 1. The extremes are represented by the solid lines, the average by the dotted line. The dots indicate each determination. Most patients required termination of treatment by feeding or intravenous glucose at 1½ to 2 hours, and the curves rise at this point.

Sixteen patients were given 60 to 90 units, and the responses here are in the lower portion of Fig. 1. Much lower levels are the rule and the average is lower, actually reaching 21 mg. %. Only one patient with a high fasting level showed an odd response, indicated by the crosses. It is possible that the nurse preparing the injection omitted the insulin. A full glucose tolerance test was carried out on this patient later and was quite normal.

Severe reactions were not uncommon, but easily controlled without complication. Ten patients had reactions in which there were convulsions (6), simple coma (2), hallucinations

(1), and wild delirious behaviour (1). Reactions of this type predominated, of course, in the group receiving the larger doses of insulin (7 to 3).

The immediate after-effects of the insulin reaction were a general state of exhaustion and quieting down of the patient, and arousal of the appetite; if intoxicated, they soon became quite sober and co-operative. Sleep was often easily obtained.

It is obvious from Fig. 1 that the level of blood glucose was profoundly affected by the amounts of insulin given—the larger the dose the more profound the effect. There can be little doubt that carbohydrate metabolism at least was put under severe stress during this period.

For the most part, this single treatment was all that was required by the patient. On a few occasions, a single further dose of 10-20 units was given subcutaneously on the second day. A sedative dose of chloral hydrate was given at bedtime in most instances.

(b) Clinical course.

The general course of these patients is depicted in Fig. 2.

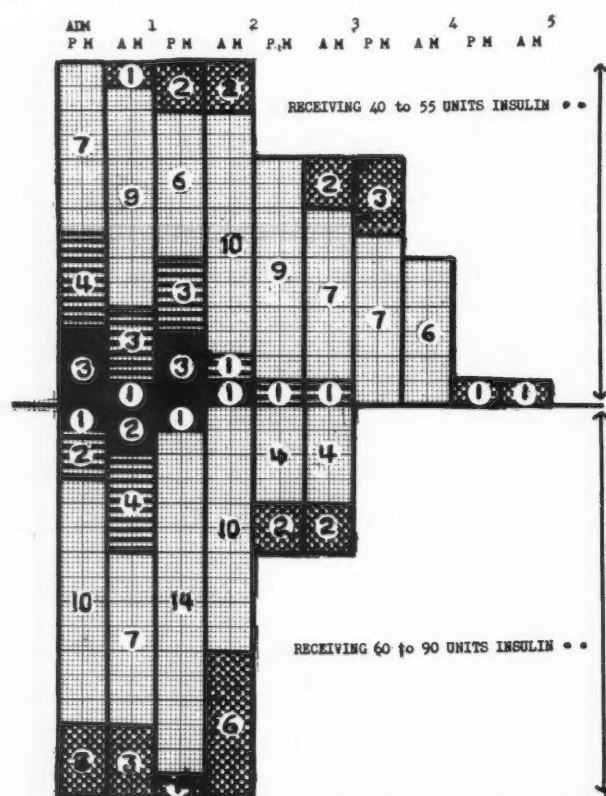


Fig. 2.—Clinical course of 30 patients. Above black horizontal line, with 40 to 55 units, below with 60 to 90 units. Solid black—poor, horizontally hatched—fair, clear—good, diagonally hatched—excellent. Each column represents a 12-hour period, beginning with the first night.

The columns represent consecutively the first night, second day, second night, third day, etc.

Above the dividing line are those 14 patients who received 40-55 units of insulin; below are those 16 patients receiving doses from 60-90 units. The solid black portion refers to those patients whose course was considered to be poor, the horizontally hatched fair, the clear good, and the diagonally hatched excellent. These columns decrease in height as patients are discharged from hospital.

The criteria for poor, fair, good and excellent were based on ability to sleep, appetite, tranquillity and assessments by the patients themselves.

The figure indicates that the course of those receiving the higher doses, plotted below, was much more satisfactory, and 10 out of those patients were ready for discharge on the third day; all 16 were discharged by the fourth day, in good or excellent condition.

Of the 14 patients treated with smaller doses, only three were discharged on the third day. Six were in hospital until the fifth day, and one did not leave hospital until the seventh day. This patient developed a mild delirium on the third day, abated on the fourth day by the administration of 50 mg. of chlorpromazine intramuscularly.

From this small group, it is evident that the treatment given was effective, and perhaps more effective when the larger doses of insulin were used. This group responded in the way characteristic of such patients in our much longer experience with insulin. Clinical improvement was unquestionable, and this group forms a satisfactory sample to study in more detail from the biochemical standpoint.

(c) Biochemical and other studies.

In two-thirds of the patients significant amounts of alcohol were present in the blood at the time of admission. The highest levels were 0.30 to 0.35%. It was impossible for us to predict the blood level from the clinical state of the patient, one with a level at 0.32% being quite sober and proper in his behaviour, while others at 0.10% were clinically quite drunk and disorderly. The blood level of alcohol on admission had no relation to the response of the patient to therapy or his biochemical state.

Admission and day-to-day studies revealed no significant abnormalities in sodium or potassium. We were unable to estimate calcium or magnesium at that time. The abnormal findings lay in the anion side of the electrolyte pattern.

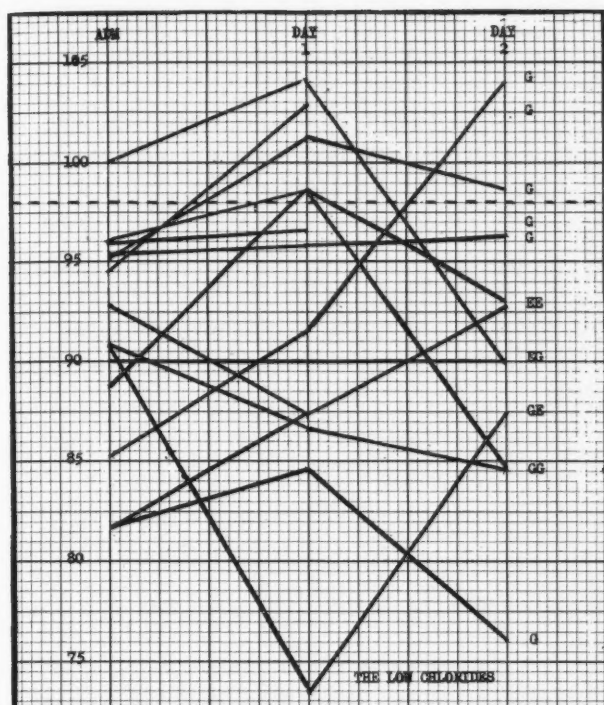


Fig. 3.—Behaviour of blood chloride level in 15 patients. Letters to the right indicate status of patient on day of final estimation.

Chloride levels were below the arbitrary low normal of 98 mEq./l. in 14 of the 30 patients on admission. The behaviour of these low chloride levels during the period of observation is seen in Fig. 3.

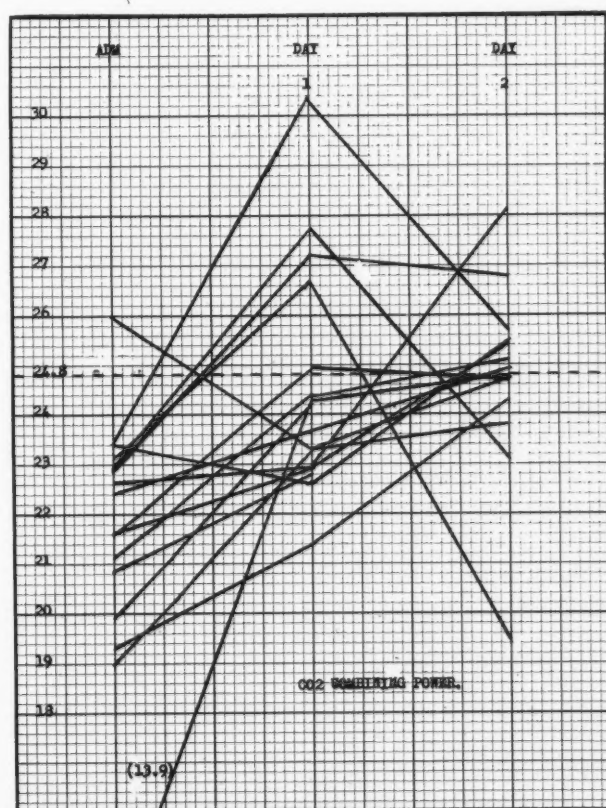


Fig. 4.—Changes in carbon dioxide combining power. Estimations expressed as mEq./l.

The scatter of these estimations can be easily seen, and no characteristic trend was established. Levels varied from 73 mEq./l. to normal values. This low level was found on the second day, when the patient was relatively well. One patient whose initial value was normal showed a moderate fall on the third day. The letters at the right side of the figure indicate the clinical state of the patient on the day of the last estimation. Even the patient with a third-day level of 76 mEq./l. was in good condition. The behaviour of the chlorides could not be correlated with the patient's response to treatment.

The chloride levels (not shown here) in 15 patients remained normal throughout the period of study.

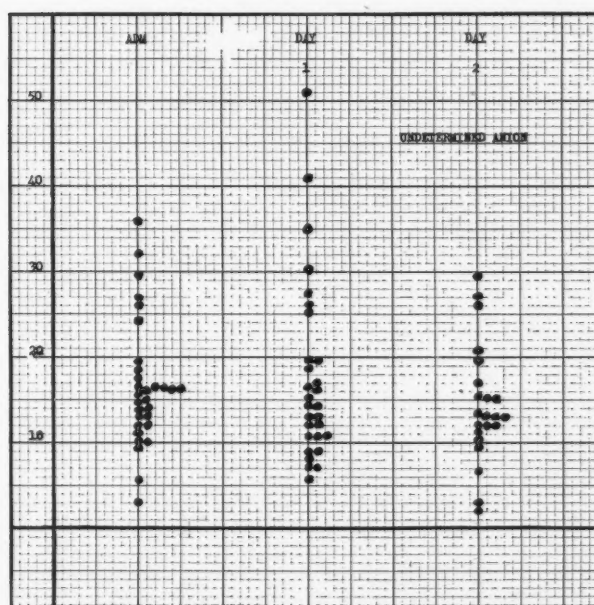


Fig. 5.—Calculation of "undetermined acid fraction" in mEq./l. Each point represents an individual estimation.

Carbon dioxide combining powers were generally low, but below the standard low figure of 24.8 mEq./l. in 15 patients. Perhaps three of these were excessively low. As shown in Fig. 4, there was a definite trend towards normal during the treatment period and with improvement.

The evidence for clinical ketosis or acidosis was slim. One patient was found to have a slightly positive serum Rothera test. Acetone was found in the urine at one time or other in only four patients. Non-protein nitrogen was always normal. Although full fractionation of serum protein was not carried out, the quantity present was normal in all cases, and reversal of albumin-globulin ratios was not seen.

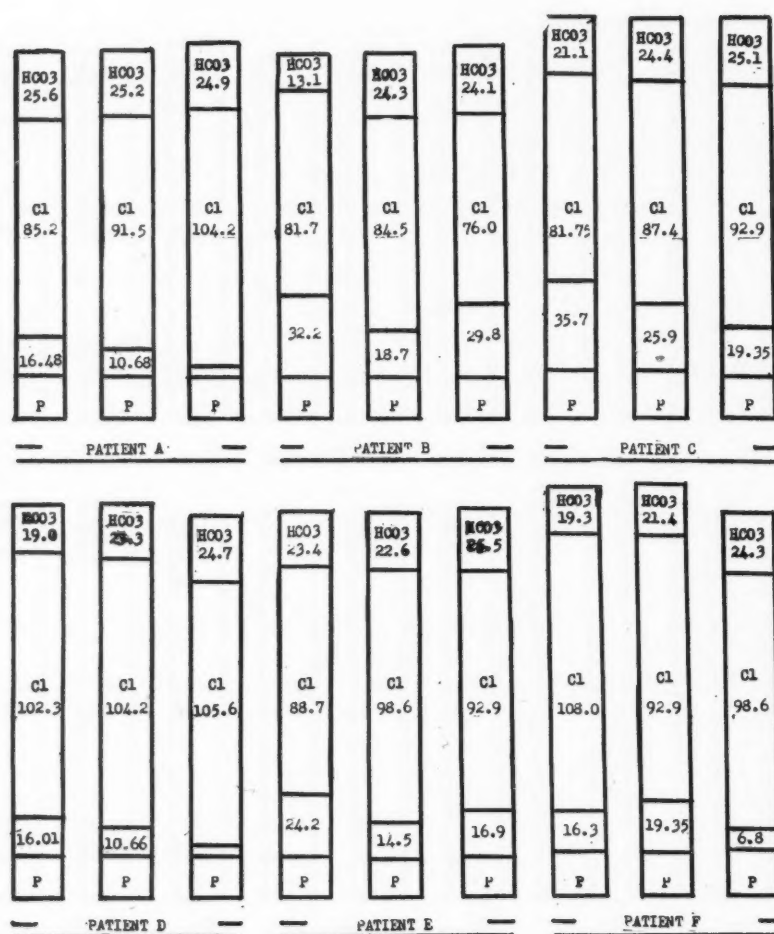


Fig. 6.—Anion side of acid-base diagram in six patients, showing day-to-day changes.

Hæmoglobin and hæmatocrit values were within normal limits.

On routine urinalysis, the most common finding was a positive Schlesinger test for urobilin, and this was present up to 4-plus in 21 patients.

To return to electrolytes, it was apparent that with cations and proteins normal, and chlorides and carbon dioxide combining powers frequently low, a relative if compensated state of acidosis must exist.

If one assumes a balance between anion and cation, then in a large number of these patients an amount of undetermined acid substances is present to a greater level than normal. The calculated amount of these substances in all subjects has been plotted in Fig. 5. This fraction evidently did not contain those organic acids detectable by the Rothera test. The average is about 17.5 mEq./l. for all patients. Over half of them on the first and second days had values greater than 15 mEq./l. Somewhat fewer values were higher than 15 mEq./l. on the third day.

It is generally considered that the so-called undetermined acid fraction amounts to 6-8

mEq./l. in normal subjects, with 2-4 mEq. further attributed to sulphate and phosphate. The undetermined fraction includes lactate, pyruvate, acetate, and other organic acids. Levels of 25-50 mEq./l. seen in some of our subjects require some explanation and we are planning to look further into the matter.

In spite of the implication of abnormality seen here, it was again not possible to correlate the findings with the clinical state of the patient.

As a matter of interest, in Fig. 6 are plotted the acid sides of the balance diagrams in some of those patients with the greatest disturbance of chlorides and carbon dioxide combining powers. The line under each three indicates the determinations for the three days studied. Again, no particular valid trend is seen, although three did tend to show a gradual day-to-day decrease in these abnormal substances, unnamed in the diagram.

(d) Urine studies.

It was rather difficult in the short period available for the study to collect adequate 24-hour urine specimens. Outputs were quite erratic, but did average about 1,100 c.c. per 24-hour period. The first collection period—that is to say, the time elapsed from the admission of the patient to the following morning—was not constant, but in this time, volume for volume, the amount of chloride excreted was very low, and tended to rise to more normal levels as each day passed. Oddly enough, the excretion of free neutral ketosteroids was slightly higher in this first period than in subsequent 24-hour periods. The amounts of these substances present were just to the low side of normal.

DISCUSSION

Our curiosity as to the degree of hypoglycæmia induced by the doses of insulin used has been satisfied by these studies. There is little doubt that a significant degree of hypoglycæmia is an essential component in treatment, if one con-

cludes that the larger doses of insulin appear to bring about a more satisfactory clinical response. We have not shed much light on the way in which the insulin produces its benefits. Insulin is certainly a sedative, and in most cases evokes a return of appetite and satisfactory eating habits.

The psychological effects of a severe insulin reaction must be very profound, and very impressive to the patient. He certainly has reason to believe that he has been given potent treatment. We have not been able to study patients by placebo therapy, or to compare simple abstinence with or without sedation, with the effects of insulin. Nonetheless, most patients are quite willing to admit that the effects of this treatment bring them to a normal state much more rapidly and comfortably than simply staying away from alcohol and "toughing it out".

In spite of the undoubted clinical improvement in these patients, it was not possible to relate the change in the patient to any change in body constants, at least in the short early period of observation. The results of our studies suggested that some abnormality of metabolism did result from the prolonged period of alcoholism, and this defect appeared to be related to the anion fraction of the acid-base balance. While the carbon dioxide combining power, when low, showed a return to normal, those patients with abnormally low chloride levels tended to show a persistence of this defect during the period of study. This was true also for those substances lumped together as undetermined acid substances. The exact nature of these substances has not yet been determined.

It is probable, of course, that our studies were not continued long enough, and we were unable to follow up those subjects with disturbed electrolyte patterns until such time as the latter returned to normal, as we presume they did.

For the future, then, we intend to study the undetermined acid fraction more fully. We will make every attempt to follow up our subjects over a longer period of time. One must be prepared to accept a disturbance of blood chloride as part of the picture of the alcoholic withdrawal state, but whether this is a primary loss, insufficient intake, endocrine influence or compensation for an increase in abnormal metabolites awaits further study.

SUMMARY

With the assistance of the Alcoholism Research Foundation of the Province of Ontario, studies were carried out in a group of 30 typical alcoholic patients admitted to a general hospital for the treatment of acute alcoholic intoxication or early withdrawal symptoms.

Treatment was limited to the use of insulin intravenously combined with 50% glucose solution. More detailed observations were made of the reaction to insulin, and the clinical course of the patients was studied in detail. The usefulness of this form of treatment was further established.

Biochemical studies carried out among these patients suggest that a disturbance of acid-base metabolism is at least a part of the clinical picture. Specifically, the major disturbance was related to chlorides and certain unidentified acid metabolites. While there was no relation between the clinical state of the patient and the disturbance of electrolytes, it is possible that the period of study was too brief. Certain future studies appear to be indicated.

TREATMENT OF ACUTE ALCOHOLISM WITH PROMAZINE

Two reports have recently appeared in the *Journal of the American Medical Association* (161: 44 and 46, 1956) on the treatment of acute alcoholic intoxication with a new phenothiazine derivative, promazine (Sparine), which is 10-(3-dimethylaminopropyl)-phenothiazine hydrochloride. In the first paper from Washington, D.C., Mitchell found promazine effective in treatment of 141 patients hospitalized for acute alcoholic intoxication, 70% of whom were also suffering from such complications as Laennec's cirrhosis. Oral doses of from 25-100 mg. every four to six hours, or by intramuscular injection where vomiting was pronounced, checked nausea and vomiting in nine out of ten cases and relieved symptoms of gastritis dramatically. The whole course of treatment lasted three to five days and withdrawal symptoms were satisfactorily controlled. No serious complications developed. Dizziness and postural hypotension were the only side-effects encountered but were less noticeable than with chlorpromazine. The drug caused no pain or local reaction on injection. Fazekas and his colleagues administered the drug either orally or parenterally to 407 acutely disturbed patients, including 42 addicts undergoing withdrawal symptoms and 262 alcoholics either with acute intoxication, delirium tremens, or acute tremulousness and/or hallucinosis. The maximum dose needed for alcoholics was usually 100 mg. Other patients required doses ranging from 50-400 mg. These authors confirm the good effects of promazine in acute alcoholism as well as in acute psychotic disturbances, and emphasize its apparent harmlessness.

Case Reports

AGRANULOCYTOSIS ASSOCIATED WITH CHLORPROMAZINE THERAPY*

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THE PURPOSE of this article is to present two cases of agranulocytosis which were observed in this psychiatric centre in association with chlorpromazine (Largactil) therapy, both of which terminated fatally.

Because of its tranquillizing properties and lack of soporific and depressive side-effects, chlorpromazine has rapidly acquired great popularity in medical practice. Although we do not yet know how it works, many enthusiastic reports indicate that the drug is exceedingly helpful in decreasing tension in various sorts of medical illnesses. This is especially true of psychiatric patients in mental hospitals. In this hospital we have been impressed by a remarkable change in the general behaviour of the psychiatric patients, who become quieter, orderly and co-operative in their attitude toward staff and daily activities. By decreasing tension, anxiety and fear, the drug has allowed many patients to take part in psychotherapeutic procedures and general recreational activities. Many experiments are being and have been made, sometimes using very large individual doses, especially with schizophrenic patients.

In anaesthesia, chlorpromazine has rapidly become an indispensable agent and its use in other specialties has become equally popular.

There have been accounts of more or less serious side-effects ranging from the trivial—various skin manifestations, sialorrhoea, pulmonary congestion, jaundice, Parkinsonism—to the most severe, agranulocytosis. Whereas the former conditions subside readily on discontinuation of the drug, agranulocytosis may run its usual fulminating course and often terminate fatally.

CASE 1

The patient, a 33-year-old white man, was first treated in the Psychiatric Hospital in Weyburn, Sask., from February 26, 1939, to July 29, 1942, for catatonic schizophrenia. His mother was a chronic schizophrenic per-

manently confined to this hospital. At first the patient improved considerably on Metrazol (pentamethylenetetrazol) therapy and hydro baths. He was discharged, became gainfully employed and was able to save some money. On readmission to this hospital in 1947 because of a relapse he showed many systematized delusions in addition to the catatonic features. He had insomnia, loss of appetite, restlessness and depression; was seclusive, negativistic and hostile at times. Electroshock and psychotherapy did not bring about any remission and the condition was further aggravated by a progressive loss of appetite and the development of spondylarthritis ankylopoietica which by 1953 had led to a considerable stiffness and kyphosis of the cervical and thoracic spine and a compensatory lordosis of the lumbar spine. The hip joints became ankylosed in moderate flexion, especially on the right side. The condition was not responding satisfactorily to adrenal steroid therapy and necessitated frequent use of analgesics, mostly in the form of salicylates. A symptom which proved to be most difficult to control was anorexia and progressive loss of weight. This was aggravated by the patient, who began to play upon the preoccupation of the staff with his food intake and refused all food unless it was carefully charted and the patient praised for taking a good meal. His weight fell gradually from 148 lb. in 1948 to 103 lb. in 1952 and remained steady around this level during the following years. The periods of acute excitement and impulsiveness became progressively more frequent and intense. From September 20, 1955, the patient remained in bed most of the time, ate poorly, and became hostile, unco-operative, resistive and aggressive. He began to develop pressure sores. In view of this it was thought that chlorpromazine might help him to overcome this episode of acute excitement and prevent impending dehydration and exhaustion. He was put on 50 mg. of chlorpromazine t.i.d. and became much less tense and irritable, and much more co-operative, and his appetite improved.

On November 25, almost two months after the chlorpromazine therapy was started, it was noticed that the patient had become more listless and paler than usual and the skin around the pressure sores had become erythematous.

At medical examination on November 27, the patient was thin and undernourished, suspicious, apprehensive and sarcastic, but co-operative. Skin and mucous membranes were very pale with a slight lemon tint. There was considerable stiffness and kyphosis of the cervical and thoracic spine with a compensatory lordosis of the lumbar spine and ankylosis of hips. There was not much pain in the affected joints on rest and attempted passive and active movements. The pressure sores in the sacral region formed a large ulceration, with the surrounding skin very erythematous. The temperature was 101° F.; pulse 130; respiration 28; B.P. 100/54 mm. Hg. The pharynx was erythematous, but no angina was present. The chest was clear to percussion and auscultation. Findings in the abdomen and C.N.S. were within normal limits. The chest radiograph was normal. Laboratory studies gave: white cell count 5,400; neutrophils 47.5; basophils 0.5; staff cells 2.5; monocytes 10; lymphocytes 39.5. The red cells were normally pigmented. Urinalysis: S.G. 1.017; pH 5. Sugar, albumin, bile and acetone negative; occasional pus cells, amorphous phosphates. The patient was becoming severely ill. He became prostrated, dyspnoeic, restless and sleepless. His temperature rose to 105.1° F. and on November 29 the white cell count was 1,250 with neutrophils 6; eosinophils 0; basophils 0, staff cells 0, monocytes 15, lymphocytes 76, disintegrated cells 2, Hb. 69% (10.75 g.). On November 30, the white cell count was 1,500, neutrophils 0, eosinophils 0, basophils 5, staff cells 0, monocytes 6, lymphocytes 85, disintegrated cells 4, E.S.R. 98 mm. in 60 min.

The patient was treated with 200,000 units of penicillin four-hourly, later increased to 500,000 units four-hourly, neomycin ointment to the bedsores and blood transfusions of 500 c.c. The patient was isolated and had meticulous oral hygiene in an attempt to avoid exposure to any pathogens.

*From the Saskatchewan Hospital, Weyburn.

Despite the treatment the course was rapidly downhill and the patient died on December 1, 1955, four days after the first elevation of temperature and three days after complete agranulocytosis in the peripheral blood was found.

Autopsy revealed: (a) spondylarthritis; (b) a minor degree of atheromatosis of aorta; (c) terminal bilateral bronchopneumonia; (d) fatty infiltration of liver; (e) enlargement of spleen; (f) cloudy swelling of the parenchymatous organs.

The laboratory findings were those of agranulocytosis. The history points to its association with chlorpromazine therapy. It is true that the patient also received occasional analgesics containing phenacetin for his arthritic pain, but he had had similar medication for long periods before, for some years without injurious effect.

complaints and appeared well until January 14, 1956, when she fairly suddenly became pyrexial, prostrated, pale, disinclined to exertion and uninterested in her surroundings. On examination she was anxious but uncommunicative, she had chills, her temperature was 103° F., and her pulse rate 132. She showed considerable lassitude. The pharynx was reddened but there was no angina. Examination of internal organs revealed no deviation from normal. The white cell count showed complete absence of granulocytes with 1,000 lymphocytes in 1 c.mm.; red cells 3,790,000; Hb. level 65%.

The patient was immediately given parenteral penicillin, 100,000 units every 3 hours, tetracycline i.v. 500 mg. daily and parenteral pentnucleotide, but showed no response until January 20. On January 21, the white cell count rose to 4,350 with 23% granulocytes. Two

TABLE I.

SIGNIFICANT CHANGES IN THE BLOOD IN CASE 2—NOV. 16, 1955. CHLORPROMAZINE THERAPY STARTED.

| Date | Red cell count | Hb. | White cell count | Neutrophils and juvenile forms | Myelocytes and premyelocytes | Lymphocytes | Mono. | Disintegrated forms |
|-------------------------------------|----------------|-----|------------------|--------------------------------|------------------------------|-------------|-------|---------------------|
| Dec. 15, 1955..... | | | 6,800 | | | | | |
| Jan. 14, 1956..... | 3,790,000 | 65% | 1,000 | 0 | 24% | 66% | 8% | 2% |
| Chlorpromazine therapy discontinued | | | | | | | | |
| Jan. 16, 1956..... | | | 700 | 0 | | 98% | | 2% |
| Jan. 18, "..... | | | 1,350 | 0 | 13% | 77 | 5% | 5 |
| Jan. 20, "..... | | | 1,700 | 24 | 25 | 26 | 23 | 2 |
| Jan. 21, "..... | | | 4,350 | 64 | 10 | 26 | | |
| Jan. 24, "..... | 3,900,000 | 78% | 35,950 | 78 | 5 | 14.5 | 0.5 | 2 |
| Jan. 26, "..... | | | 52,700 | 91 | 5 | 1 | 1 | 2 |
| Jan. 30, "..... | 4,360,000 | 87% | 42,500 | 93 | | 6 | 1 | |
| Feb. 3, "..... | | | 24,700 | 91 | 1 | 5 | 1 | 4 |
| Feb. 13, "..... | | | 10,750 | 81 | | 19 | | |
| Feb. 20, "..... | | | 5,100 | 62 | 1 | 37 | | |

CASE 2

A 53-year-old white female school teacher, of normal build and development, had suffered no previous physical disability, but her brother was treated in this hospital for schizophrenia 28 years before. Shortly after her marriage she developed an acute emotional disorder associated with a delusional belief that she was suffering from a venereal disease as a result of promiscuity before her marriage. She improved after six months' hospital treatment and was paroled, but she remained mentally unstable and her adjustment to family life was poor. She divorced her husband and had to give up teaching in 1939. She was readmitted to the mental hospital in 1946, confused and delusional. She had ideas of reference and auditory hallucinations, was withdrawn, incoherent and apathetic, and her attention was inadequate. A diagnosis of paranoid schizophrenia was made. She failed to show any improvement on electroconvulsive therapy and psychotherapy and was gradually regressing and deteriorating. She frequently refused food, became idle and believed that she was teaching imaginary classes. At other times she thought she was in Hell. Occasionally she became aggressive and noisy and danced about the ward. She was becoming progressively retarded and untidy and refused to attend recreation.

On November 16, 1955, the patient was included in a group for chlorpromazine therapy. She received the drug in increasing doses at a rate of 25 mg. t.i.d., going from 25 mg. t.i.d. to 300 mg. t.i.d. for 7 days, then in decreasing doses at the same rate to 25 mg. t.i.d. On December 15, 1955, physical examination revealed no abnormality and the white cell count was 6,800. Her illness changed little but she became less tense and more easily persuaded to take part in recreation, and her attitude to staff became more pleasant. She had no

days later it was 20,950 with 79 granulocytes. At the same time she developed a pustular eruption in the sacral and lumbar area. The culture revealed haemolytic *Staph. aureus* and *Pseudomonas pyocyanea*. These organisms were insensitive to all antibiotics.

The white cell count gradually rose to 52,700 with 86% neutrophils on January 26, but no improvement in her general condition was noticed. On February 5, a purulent pleural effusion was obtained by aspiration, which contained *Pseudomonas pyocyanea* weakly sensitive to sulfadiazine. The patient now presented a clinical picture of septicopyaemia with increasing lassitude, prostration and paleness, continued temperature of 102-104° F., systolic murmur at the apex, headache and increasing neck rigidity, bronchopneumonia with empyema, increased indirect bilirubin, albumin and red cells in urine. No response to antibiotics was noticed and the empyema required frequent aspirations. On February 14, rib resection was needed and repeated bacteriological study of the exudate showed *Pseudomonas pyocyanea* which was practically insensitive to all antibiotics. The white cell count fell gradually to less than 10,000 and remained on this level. On February 21, the pneumonia spread to the left side, producing considerable dyspnoea and increasing toxæmia. She died two days later. Autopsy revealed septicopyaemia and bilateral confluent bronchopneumonia with abscess formation, empyema, acute endocarditis, basal meningitis, embolic kidneys, splenomegaly with infarctions and abscesses. The smears from abscesses showed very numerous *Pseudomonas*.

The interesting feature in this case is the development of a *Pseudomonas* septicopyaemia at a time when the agranulocytosis appeared to have

subsided. It seems reasonable to assume that in Case 2 the portal of entry of infection by the ubiquitous *Pseudomonas* was the skin of the sacral area at the time when resistance of our patient was at its lowest. This fact appears to stress the great importance of management of patients with agranulocytosis in isolation and with strict aseptic technique in order to avoid exposure of patients to accidental invaders. Whether the use of massive doses of antibiotics should be a standard procedure in every case of agranulocytosis deserves further elucidation in view of the fact that a severe infection by resistant species such as *Pseudomonas pyocyanea*, *Proteus*, or certain strains of staphylococci may be promoted by suppression or elimination of the sensitive antagonistic species, thus upsetting a possible equilibrium between the two groups of micro-organisms. This problem appears especially important in agranulocytosis because of the special condition of decreased resistance on the part of the host. It seems not impossible that in this case as in many other similar published cases the use of antibiotics was a contributing factor in the development of septicopyæmia. A search for new antibiotics to eradicate emerging resistant species may be the best solution to this problem in the future.

DISCUSSION

Agranulocytosis was first described at the beginning of this century and was defined as a fulminating disease characterized by neutropenia, fever, prostration, ulceration of skin and mucous membranes, rapidly leading to sepsis and death in a great majority of cases. The great increase in incidence of late years has been traced to increased use of certain drugs, especially aminopyrine but also such compounds as sulfonamides, barbiturates, thiourea derivatives, phenantoin, phenindione, certain antihistaminics and antibiotics such as chloramphenicol and streptomycin; gold, arsenicals, nitrogen mustard and many others were later implicated. A common feature of these compounds seems to be the presence of aromatic radicals.

In the literature I have so far traced nine cases of agranulocytosis associated with the use of chlorpromazine. (a) Six cases were reviewed, one presented and one reported in December 1955, by Rotstein, Frick and Schiele.¹ (b) Another fatal case was presented in January

1956 by Theriault.² I am adding two more from my own observation.

It appears that the toxic agent, chemical, bacterial or unknown, may act either by interference with metabolism of the precursors of the granulocytic series so that mature granulocytes cannot be formed, or by a direct leukocidal action, or by producing an antigen-antibody reaction. The immunological mechanism of leukocyte destruction seems most probable but no granulocytic agglutinations in the blood have as yet been demonstrated.

The immunological theory appears to have some support from the observations that: (1) Usually a few weeks elapse between the initiation of chlorpromazine therapy and the first manifestation of agranulocytosis. It may be argued that this time is necessary for the development of antibodies. (2) The total dose of the drug seems to play only a minor role. Our first patient received much smaller doses which were spaced over a much longer time than the second and yet the course of the disease in the first case was much more fulminant and terminated fatally in much shorter time than in the second case. The management of agranulocytosis calls for preventive measures and actual treatment. Immunological theory would suggest that certain individuals may develop hypersensitiveness to the drug more readily than others. If a simple procedure could be designed to test the allergic response of the patient under treatment, many serious complications would be avoided.

In the present situation the only feasible precaution against complication seems to be a frequent differential leukocyte estimation. Here it may be noted that this need for additional laboratory work creates a serious problem in most psychiatric hospitals in which laboratory facilities are disproportionately small, especially in face of the ever-increasing use of the drug.

Treatment consists of isolation, with emphasis on rigid aseptic and antiseptic technique, use of antibiotics and symptomatic measures. The use of cortisone and ACTH remains under discussion.

If the immunological theory of agranulocytosis is accepted, an indication for the use of steroids would exist because of their assumed interference with the antigen-antibody reaction. Isolated cases of agranulocytosis are reported to have im-

proved on cortisone but no controlled series has been published.

The incidence of agranulocytosis in patients receiving chlorpromazine in this hospital has been estimated as 1 in 500.

SUMMARY

Two cases of agranulocytosis associated with chlorpromazine therapy are presented. Both patients died, one following a short fulminating course, the other recovering initially from agranulocytosis but succumbing to *Pseudomonas pyocyanea* septicopyæmia, which developed in association with the agranulocytosis. The pathogens were insensitive to antibiotic or bacteriostatic agents.

Etiology, incidence, pathogenesis, preventive measures and treatment are briefly discussed.

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ADDISON'S DISEASE ASSOCIATED WITH NEUROFIBROMATOSIS*

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NEUROFIBROMATOSIS (von Recklinghausen's disease) is a disease of congenital origin. It is characterized by the formation of a variety of tumours and by cutaneous pigmentation. Pigmentation, which is more evident on the trunk than the limbs, is almost invariably present, and consists of brown spots ("café au lait") of minute to four-inch (10 cm.) size. The tumours are usually cutaneous fibromas or perineural fibroblastomas, but may be gliomas or meningiomas. They are composed of bundles of long spindle cells, and may in time become sarcomatous. There are two main types of the disease, peripheral and central; the latter may be perineural or meningeal or a combination of both. In some cases, both peripheral and central manifestations are seen. The cutaneous fibromas, mollusca fibrosa, are pink sessile or pedunculated swell-

ings, soft in nature, and may be as large as an orange. They appear chiefly on the trunk.

Neurofibromas are movable nodules lying on superficial cutaneous nerves and may be painful. "Plexiform neuroma" is a diffuse neurofibromatosis of nerve trunks which may show associated overgrowth of skin and subcutaneous tissues. Acoustic and visceral neurofibromas have been described. Retinal masses, phacomias, may be seen. The latter may involve the adrenal glands.¹

There may be kyphoscoliosis and hyperostosis or bony rarefaction.

The general evidences of Addison's disease are well-known — weakness and easy fatigability; abnormal pigmentation of mucous membranes, pressure points, and flexor creases, and sometimes vitiligo of other areas; weight loss and dehydration; hypotension and small heart size; gastrointestinal upsets; hypoglycæmic manifestations; syncopal attacks; irritability; changes in gonadal function and secondary sex characteristics and weakness of the voice. The oral glucose tolerance curve is flat. The electrocardiogram shows a prolonged PR interval and low-voltage complexes. The onset is usually insidious but a crisis may be precipitated by an acute infection, operation, or great physical effort.

Urine study of adrenal cortical function is based upon study of: (1) the corticoids, those adrenal substances which in process of metabolism still retain a ketol side-chain at C 17; (2) 17-ketosteroids. Men excrete an average of 14 mg. of 17-ketosteroids in 24 hours and women excrete an average of 9 mg. in 24 hours. The glucocorticoids may be measured by bioassay or chemical extraction. Normally, the male excretes an average of 60 glycogen units in 24 hours, and the female 40 glycogen units in 24 hours. The excretion of glucocorticoids is usually very low in Addison's disease, but this depends on the degree of destruction of the adrenal cortex.

Desoxycorticosterone acetate has more electrolyte-regulating effect than other available steroids; its effect is that of stimulating renal tubular reabsorption of sodium and chloride from the glomerular filtrate. The ability of the kidney to excrete potassium falls in Addison's disease, and there is failure to produce diuresis after ingestion of a load of water. The Robinson-Power-Kepler test is founded on this fact. Aldosterone, an important electrolyte-regulating factor, has been isolated but is not commercially available. In patients with Addison's disease the

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TABLE I.

| Father | | Mother | | Aunt (of patient) | | |
|--|---|--|---------------|--|---------------|--|
| | | (1) Cutaneous fibromas (2) No café-au-lait spots (3) Plexiform neuroma of finger | | (1) Cutaneous fibromas + (2) Café-au-lait spots | | |
| Patient 45 | Ruth 43 | Vernon 41 | H. (F.) 39 | B. (F.) 37 | S. (F.) 35 | |
| (1) Cutaneous fibromas (2) Café-au-lait spots (3) Addison's disease (4) ? C.N.S. lesion | (1) Cutaneous fibromas (2) Café-au-lait spots (3) Plexiform neuroma of finger | Convulsions age 22, died at 34 of "brain tumour" No autopsy (1) Cutaneous fibromas (2) Plexiform neuroma of finger | No signs | | | |

effects of cortisone on electrolyte metabolism have been small and variable.

Muscle fatigue is not prevented as efficiently by desoxycorticosterone as by the glucocorticoids, and patients with Addison's disease show striking improvement in their capacity to perform work after treatment with cortisone.

Adrenal insufficiency may be selective as well as quantitative—one panel of cortical activity may be functioning normally.

A 42-year-old unmarried white man felt perfectly well until he had whooping cough in November 1951. Subsequently he began to experience increasingly easy fatigability. Two months before admission to hospital (in September 1952), he had gastroenteritis and vomited for two days. As long as he could remember he had had small sessile and pedunculated nodules in his skin. The family history is an interesting one (see Table I).

When admitted to hospital he weighed 100 lb. and had tanned skin and dark palmar creases. B.P. was 100/70 mm. Hg. Haemoglobin value was 90% but fell to 78% during hospitalization after therapy was instituted. His serum sodium level was 128 mEq. and potassium 6.1 mEq. per 100 c.c. The Kepler-Power water test showed a night volume of 480 c.c. urine, the largest hourly day specimen being 105 c.c. An ACTH (4-hour) test showed a fall in eosinophils from 171 to 140. Tuberculin test (1/10,000) was strongly positive. Insulin tolerance test, using 2.27 units crystalline insulin, produced a typical mild hypoglycaemic response and a blood sugar level of 33 mg. % in ½ hour. Two and one-half hours later it was still only 65 mg. %.

His 17-ketosteroid excretion was 3.7 mg. in 24 hours but his total corticoid excretion for 24 hours was 60 glycogen units.

E.C.G. and flat plate radiographs of abdomen and chest were not remarkable. A biopsy of a pedunculated skin tumour showed it to be a neurofibroma.

A diagnosis was made of von Recklinghausen's disease, neurofibromatosis, and Addison's disease, and the patient was placed on 25 mg. cortisone orally t.i.d. and 1 g. of salt q.i.d.

He was admitted to hospital again in July 1953, complaining of aching pains in thighs, of one month's duration. The pain distribution suggested sciatica but radiological examination showed only spondylolysis of the fifth lumbar vertebra, without spondylolisthesis. There were no abnormal neurological signs. At this time, Hb. value was 96% and red cell count 6,140,000. Serum sodium was 122.7 mEq., and potassium 5.28 mEq. Fasting blood sugar was 85 mg. % and the glucose tolerance curve (oral) was as follows: fasting, 95 mg. %; 1 hour, 178 mg. %; 2 hours, 159 mg. %; 3 hours, 140 mg. %;

4 hours, 130 mg. %; 5 hours, 116 mg. %. His 17-ketosteroid excretion for 24 hours was 5.1 mg.

The patient received 2 mg. of desoxycorticosterone acetate intramuscularly daily for two days. His serum sodium was then normal, and he was discharged on cortisone 37.5 mg. daily and salt 6 g. daily.

His next admission to hospital was in July 1955, in the middle of a very hot season. His chief complaint was his extreme weakness and fatigability for one month. He had been taking 50 mg. of cortisone and 6 g. salt (daily for one year), but had been too nauseated to take the latter for the week before admission.

In addition to previously noted papillomata, he showed three oval (½ inch) café-au-lait spots on the abdomen. His deep tendon reflexes on the left side were greater than those on the right, and his plantar responses were equivocal. Otherwise, neurological examination was negative. He had no costo-vertebral angle tenderness.

His serum sodium level was 124.7 mEq. and potassium 5.83 mEq. He received 2,000 c.c. of 5% glucose in saline intravenously at once and then was put on 4 g. of salt orally daily and desoxycorticosterone acetate (2 to 5 mg.) intramuscularly. His electrolyte picture reverted to more normal levels within a week, and he was discharged on cortisone 25 mg. daily, dietary salt only, and monthly intramuscular doses of 25 mg. of desoxycorticosterone trimethyl acetate.

DISCUSSION

Although not proven, the possibility that neurofibromatosis may be a cause of adrenal insufficiency is sufficiently rare to warrant reporting. The familial aspects of neurofibromatosis in this patient are tabulated. The other interesting aspect present is the selective type of adrenal insufficiency. Despite the fact that he presented all the classical signs and symptoms of Addison's disease, this patient had a carbohydrate panel which was functioning within normal limits. It was therefore assumed on the basis of the assays that the electrolyte and androgenic panels were deficient. It is this type of patient who requires an emphasis on NaCl and desoxycorticosterone when therapy is instituted. It is worthy of note that the patient received the long-acting trimethyl desoxycorticosterone acetate—a most useful addition to therapy. Since discharge the patient has required the addition of 5 g. sodium chloride per day in enteric-coated tablets and the injec-

tion of trimethyl desoxycorticosterone acetate every three weeks.

The authors are indebted to Dr. Stanley Brown of Granby, Que., for allowing them to present this case.

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PREGNANCY COMPLICATED BY RUPTURED FIBROID*

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ON SEPTEMBER 15, 1954, a 42-year-old woman stated, during her first visit to my office, that she had last menstruated on June 15 of that year. The flow had been scanty and dark in colour. She had two children, aged 17 and 15 years, and had had no other pregnancy. She wondered whether after so long a period she might be pregnant.

Her history revealed that she had been having pelvic discomfort for at least a year, and had not heeded her husband's advice to consult a doctor. Her physical examination was negative, apart from the abdomen. Here, a reasonably uniform, semi-firm mass was felt just above the pubis. It seemed to be central and was not tender. Pelvic examination showed that the mass seemed to be uterus, and the whole picture was that of a pregnant uterus of about 12 weeks' gestation. She was told that she was probably pregnant and that all was well, and she prepared to raise a "second family".

On her second visit to my office, on October 13, 1954, she stated that she thought she had noticed fetal movements for a week or two, and I wondered whether her date of conception was a little earlier than that of June 15 proffered by her. The size, shape, and consistency of the fundus were consistent with a pregnancy of about 4½ months. On her next antenatal visit on November 5, 1954, I could feel a firm mass, like a small fetal head, to the right. This was continuous with the softer normal uterine body to the left. The whole presenting mass was reasonably rounded. I told the patient of my misgivings, and gave her a slip for x-ray, which I hoped would prove or disprove the presence of a pregnancy, and would give a clue to the nature of the mass on the right of the uterus. Multiple pregnancy was considered, as enlargement had now reached six months' proportions. No fetal heart was heard. The patient felt well and all other findings were normal.

On November 10, I was called because the woman had suffered severe pain in her right lower abdomen, when pulling on the head of the bed to raise herself. She vomited twice. On admission to hospital, she was seen for me by Dr. George Lewis. Radiography on November 8 showed pregnancy to be present. It was decided to do a laparotomy the next morning, in order to explore the nature of the increasingly painful and tender tumour, which was thought to be either a large degenerating fibroid or a dermoid. Tests showed the blood to be Rh-positive, with a white cell count of 12,850 and Hb. level 12.9 g. per 100 c.c..

*Submitted through the College of General Practice of Canada, Toronto.

At operation on November 11, 1954, a ruptured, degenerated, subserous fibroid 5¼ inches (13 cm.) in diameter was found on the right side of the uterus blending with the general uterine contour; examination revealed that it had perforated. There was free fluid in the lower abdomen and the pouch of Douglas. (Culture of this fluid proved sterile.) At this juncture, a further consultation was held in the operating room. It was decided to take a biopsy specimen to rule out any malignant change, and to do nothing else. The abdomen was closed without drainage. The postoperative course was a bit stormy because of abdominal distension and a basal pulmonary infection. The patient left the hospital on November 24, 1954.

I was called to see her again at her home on November 29, 1954. She had right lower abdominal pain and fever. She was again hospitalized and after lung infection and subdiaphragmatic infection were ruled out, conservative treatment was adopted. On December 6, 1954, the abdominal incision was protruding, not reddened, and appeared ready to herniate. On the night of December 8, the incision burst, presenting us with at least a quart of pus. The patient immediately felt better. From this time until her discharge from hospital on December 16, the wound continued to discharge degenerated fibroid and suture material. The biopsy showed only degenerated fibroid tissue.

She was now 5½ months pregnant, and she was cared for at home, until she was able to make office visits. A latex drain was inserted into the sinus when it was becoming too small for effective drainage and removal of occasional loose pieces of fibroid which sloughed out from time to time. Her general health improved markedly, and all laboratory data were normal.

When she was 7 months pregnant, the patient was brought to a Kellogg Course meeting at Peterborough Civic Hospital. Her case created much interest, as no one had seen a similar one. It was agreed that labour if normal should be allowed to progress, but preparations should be made to cope with difficulty.

The patient went into labour spontaneously on April 8, 1955. Labour progressed normally, and there was no post-partum hæmorrhage. The baby weighed 8 lb. 6 oz., and the duration of the labour was approximately 7 hours. The small sinus was covered with adhesive, and prepared in the usual way. Examination six weeks postpartum showed the fibroid to be then about 2 inches in diameter; all else was normal. Both patient and baby are now very well indeed. We hope to be able to leave the uterus and fibroid alone. The sinus tract finally healed on May 28, 1955. The drain had been removed on January 18, 1955, about two months after operation.

DISCUSSION

Donald¹ in discussing fibroids and pregnancy points out that there is great difficulty in diagnosis when the tumour is not discrete. This applied in our case. He also points out that when fibroids are diagnosed for the first time during pregnancy, their removal is seldom indicated. He further states that only refractory cases of acute degeneration require, or justify, myomectomy. How does one judge a refractory case? It is also stated that apparent uterine asymmetry in early pregnancy is common, and fibroids are easily diagnosed when none exist at all. Fibroids never cause amenorrhœa. Donald also points out that although a fibroid is of harder consistency than the gravid uterus, one can easily be misled if twin pregnancy exists.

An interesting comment is that the non-gravid half of a variety of double uterus may be clinically indistinguishable from a fibroid.

Since nature fortunately marsupialized this fibroid, would such treatment at operation be worth considering? Would sloughing have occurred without biopsy? In other words, after diagnosis should one simply close the abdomen? When does a degenerating, ruptured fibroid become what Donald calls refractory?

The management of this most interesting case has been a good example of the team work possible between the specialist and the general practitioner.

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Special Article

SOME FIGURES ON LOST TIME DUE TO SICKNESS AND ACCIDENT IN INDUSTRY*

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THIS REPORT presents a summary of some data on absences due to sickness and accident among employees of eight companies during 1954. For the recording of lost-time morbidity each company used either the Marginal Punch Card or the Dual-Purpose Card system designed by the Divisions of Industrial Hygiene and Medical Statistics. The records on which this report is based were prepared by the medical departments of the companies and made available to the Ontario Department of Health for analysis.

SCOPE AND METHOD

The medical department of each of the companies maintained a record of all absences due to sickness or accident lasting one calendar day or longer. Each of the systems used makes provision for the recording of the following essential information: name, sex, age, department, occupation, order of absence, date absence began,

date absence ended, calendar days lost, diagnosis, whether occupational or non-occupational, and the termination of the absence. The Marginal Punch Card system also provides for identification of the number of times the employee is absent.

The summary of the morbidity experience included here is that of the combined staffs of the eight companies. The average population comprised 5,918 persons, 4,501 males and 1,417 females. The data cover all absences due to sickness or accident which began during 1954 and which caused loss from work of one full calendar day or more. One company reported the experience of male employees only for a period of 10½ months; these data have been adjusted to a full calendar year.

Diagnoses were tabulated according to seven *condensed diagnosis groups*. The inclusions within these seven condensed diagnosis groups correspond with groupings used in the International Statistical Classification of Diseases, Injuries and Causes of Death, WHO 1948.

The following three indices of morbidity were computed:

- I. Frequency Rate—Annual number of absences per 100 persons.
- II. Disability Rate—Annual number of days lost per person.
- III. Severity Rate—Average number of days lost per absence.

These indices were computed for each sex by age group and by *condensed diagnosis group*. The number of persons used for these calculations was the mean of the total numbers of persons on the payroll of each of the eight companies at three intervals, distributed by sex and age groups (Table I).

TABLE I.

| AVERAGE NUMBER OF PERSONS EMPLOYED BY AGE GROUP AND SEX | | | |
|--|-------|---------|---------------|
| Age group | Males | Females | Both sexes |
| Under 25..... | 498 | 600 | 1,098 |
| 25 - 34..... | 1,348 | 487 | 1,835 |
| 35 - 44..... | 1,313 | 167 | 1,480 |
| 45 - 54..... | 834 | 118 | 952 |
| 55 and over..... | 508 | 45 | 553 |
| Total..... | 4,501 | 1,417 | 5,918 |

STATISTICAL ANALYSIS

There were 3,520 persons absent during the year (2,182 males and 1,338 females). The total male employees absent amounted to 48% of the average number of males employed; female employees absent amounted to 95% of the average number of females employed.

Of the 7,912 absences due to sickness or accident during the year, 3,872 (49%) were of males and 4,040 (51%) were of females. A total

*Prepared by the Divisions of Industrial Hygiene and Medical Statistics, Ontario Department of Health, Toronto, November 1955.

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‡Division of Industrial Hygiene, Ontario Department of Health.

of 43,188 calendar days were lost by these absences of one or more full day's duration. Of the total number of days lost, 28,206 (65%) were accounted for by male personnel and 14,982 (35%) by female personnel.

MORBIDITY EXPERIENCE BY AGE

The three morbidity indices by age group and sex are presented in Table II.

TABLE II.

| MORBIDITY INDICES BY AGE GROUP AND SEX | | | | | | |
|--|---|-----|---------------------------------------|------|---|------|
| Age group | I frequency rate | | II disability rate | | III severity rate | |
| | Annual number of absences per 100 persons | | Annual number of days lost per person | | Average number of days lost per absence | |
| | M | F | M | F | M | F |
| Under 25 | 127 | 351 | 4.7 | 10.9 | 3.7 | 3.1 |
| 25 - 34... | 91 | 287 | 4.9 | 9.9 | 5.3 | 3.4 |
| 35 - 44... | 76 | 209 | 5.7 | 12.6 | 7.6 | 6.0 |
| 45 - 54... | 74 | 107 | 7.5 | 7.9 | 10.1 | 7.4 |
| 55 and over... | 78 | 133 | 10.9 | 13.7 | 14.0 | 10.2 |
| Total. | 86 | 285 | 6.3 | 10.6 | 7.3 | 3.7 |

The annual number of absences per 100 persons was 86 for males and 285 for females. The frequency rate was highest at ages under 25 years for both males and females. The annual number of calendar days lost per person among males was 6.3 days and among females 10.6 days. The highest disability rate for both sexes occurred in the age group 55 years and over. The disability rates for females in each of the first three age groups were more than twice the rates for males. The average number of days lost per absence for all males was 7.3 days and among all females 3.7 days. The highest severity rate for both sexes occurred at ages 55 years and over.

The number of absences per 100 persons at all ages was greater for females than for males, the M:F ratio being 1:3.3. The number of days lost per person was greater for females than for males, the M:F ratio being 1:1.7. The average number of days lost per absence was greater among males than among females, the M:F ratio being 1:0.5. When menstrual disorders and complications of pregnancy are excluded, the frequency and disability ratios decrease to 1:2.9 and 1:1.5 respectively, while the ratio of the severity rates remains unchanged.

DURATION OF ABSENCES

The relative importance of absences of various durations in the total picture is demonstrated in Table III.

TABLE III.

| PERCENTAGE DISTRIBUTION OF DURATION OF ABSENCES IN CALENDAR DAYS, BY SEX | | | | |
|--|----------|--------|---------------|--------|
| Duration calendar days | Absences | | Calendar days | |
| | Male | Female | Male | Female |
| 1..... | 42.6 | 51.6 | 5.8 | 13.9 |
| 2..... | 10.1 | 11.3 | 2.8 | 6.1 |
| 3..... | 12.4 | 14.5 | 5.1 | 11.7 |
| 4 - 7..... | 18.4 | 15.3 | 13.2 | 20.9 |
| 8 - 28..... | 11.2 | 5.5 | 23.1 | 22.0 |
| 29 - 91..... | 4.3 | 1.6 | 28.4 | 20.7 |
| 92 and over..... | 1.0 | 0.2 | 21.6 | 4.7 |
| Total number... | 3,872 | 4,040 | 28,206 | 14,982 |

Absences lasting one calendar day accounted for the bulk of the total absences—42.6% of male absences and 51.6% of female absences. Absences of three calendar days or less accounted for 65.1% of male absences and for 77.4% of female absences but for only 13.7% of the calendar days lost for males and for 31.7% of the calendar days lost for females.

Of the total number of absences among males, 16.5% lasted eight calendar days or longer and contributed 73.1% of the total number of days lost. Among females, 7.3% of all absences lasted eight calendar days or longer and contributed 47.4% of the total number of days lost.

TABLE IV.

| MORBIDITY INDICES BY CONDENSED DIAGNOSIS GROUP AND SEX | | | | | | |
|--|---|-----|---------------------------------------|------|---|-----|
| Condensed diagnosis group | I frequency rate | | II disability rate | | III severity rate | |
| | Annual number of absences per 100 persons | | Annual number of days lost per person | | Average number of days lost per absence | |
| | M | F | M | F | M | F |
| Acute upper respiratory infections.. | 29 | 91 | 0.8 | 2.5 | 2.7 | 2.8 |
| Other diseases of respiratory system..... | 12 | 26 | 0.8 | 1.2 | 6.7 | 4.6 |
| Diseases of digestive system..... | 16 | 71 | 1.1 | 2.2 | 6.8 | 3.0 |
| Disorders of menstruation..... | — | 30 | — | 0.6 | — | 2.1 |
| Symptoms and ill-defined conditions.. | 12 | 30 | 0.4 | 0.9 | 3.0 | 3.0 |
| Accidents and violence..... | 6 | 9 | 1.1 | 0.6 | 17.7 | 6.7 |
| Other specified causes..... | 11 | 28 | 2.1 | 2.6 | 20.0 | 9.3 |
| Total | 86 | 285 | 6.3 | 10.6 | 7.3 | 3.7 |

PRINCIPAL CAUSES OF ABSENCE

The three morbidity indices by sex and condensed diagnosis groups are set out in Table IV.

Male personnel lost an average of 0.8 calendar days during the year because of the acute upper respiratory diseases, compared with 2.5 days among females. Males also lost fewer days because of diseases of the digestive system (1.1 to 2.2).

The frequency rate for acute upper respiratory infections was more than three times as high for females as for males. The severity rate for this cause was only slightly less for males than for females.

For "other specified causes", the female experience was about $2\frac{1}{2}$ times higher than the male experience in the frequency rate, but about one-half the male experience in the severity rate.

The number of days lost per person because of accidents was low for both males and females (1.1 days for males, 0.6 days for females). Male personnel lost more than $2\frac{1}{2}$ times as many days per accident as did female personnel.

MORBIDITY BY CLASS-DIVISION

Occupational conditions comprised only 3.4% of the absences and 10.9% of days lost for males, and for 0.4 and 1.3% for females.

Accidents contributed 7.6% of the absences and 18.0% of the days lost for males, 3.1% and 5.7% for females.

Clinical and Laboratory Notes

THE USE OF CHLORPROMAZINE IN INTRACTABLE PAIN ASSOCIATED WITH TERMINAL CARCINOMA*

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F.F.A.R.C.S.,† and
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OUR INTEREST in the problem of the control of pain in terminal carcinoma arose from the realization that many of these patients, in their last days, live unhappy lives not solely because of their disease, but because of well-intentioned treatment directed at relief of their discomfort.

*Presented at the Annual Meeting of the Ontario Medical Association, Toronto, Ont., May 11, 1956. A study supported by a grant from the Ontario Cancer Treatment and Research Foundation.

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The problem as we see it is one of attempting to make the discomfort bearable, while maintaining as far as possible and for as long as possible a reasonable pattern of life within the family and the community.

The problem of pain in patients in the terminal stages of carcinoma is complicated by the fact that their medical attendant, their relatives and usually the patients themselves are aware of the certainty of the fatal outcome. Since the pain and discomfort have a foreseeable end, the medical attendant is only too likely to feel that nothing need be done but to obliterate the consciousness of pain, and almost to obliterate consciousness itself, by the use of large doses of narcotic drugs. The patient's family must contend with the pain and the depressing features of the treatment, and eventually with a complete degeneration of the patient's morale.

From the outset in this study we were aware that much of the pain experienced by these patients has an emotional basis as well as a physical one. It is common knowledge that the threshold for pain is greatly lowered by emotional disturbances. The patient who has just become aware that his pain is due to malignant disease, or that it is likely to continue because his disease is incurable, frequently becomes the victim of panic, and pain which was previously only a minor annoyance becomes intolerable and overpowering. On the other hand, anxiety about the cause of pain may magnify the patient's discomfort. Exaggeration of pain may occur through anticipation or fear that the pain will become worse or that it will recur. Other uncomfortable sensations, if persistent, may be interpreted and described as pain. It was especially because of the emotional factors involved in suffering from intractable pain that it was felt that chlorpromazine might be useful in the management of these cases; it was probable that if the emotional tension and apprehension concerning the outcome of the disease could be reduced, these patients would be less inclined to consume large quantities of sedative drugs, and so escape many of the undesirable secondary effects which the narcotic drugs produce.

In attempting to evaluate the pain problem in a particular patient, the questions of drug addiction and drug dependency must be considered. The custom is widespread of judging the severity of pain or discomfort on the basis of the quantity and quality of analgesic drugs required for control. A very large proportion of patients suffering from intractable pain become addicted to drugs, and so this criterion of the severity of their suffering is no longer valid. In some cases a considerable part of the patient's discomfort may, in fact, be due to such addiction. Quite aside from true addiction, many patients develop a pathological dependency on drugs of one sort or another, feeling certain that if they do not take particular drugs in definite amounts their pain will become unbearable. We have known

this to extend to specific brands of salicylates. One must beware that such dependency is not mistaken for benefit derived from drugs under investigation.

We have studied a total of 38 patients referred to us with problems of intractable pain. Of these, 26 were ambulatory when first seen, and 12 were in-hospital patients. Of these patients we have been able to follow up only 32, and of this number 21 are known to be dead of malignant disease. Each patient, after assessment, was given a basic daily dose of chlorpromazine, this varying somewhat with the age of the patient, but being usually 150 mg. per day. Our routine method was to give 25 mg. by mouth four times during the day and 50 mg. at bed-time. Outpatients were asked to reduce the amount of analgesic drugs taken to that required when they were actually experiencing pain, and a record was made of the amount of analgesic drug which had been customarily taken before treatment with chlorpromazine was begun. Once the patient's confidence was gained, regular doses of chlorpromazine greatly reduced the necessity for narcotics. It has become evident that many patients who were taking large quantities of narcotics, usually codeine or Demerol, had been using more than was actually required for the relief of pain. We are aware that chlorpromazine itself is not an analgesic drug. We are also aware that the action of the narcotic drugs is potentiated by chlorpromazine, and that one must take this fact into consideration in estimating the actual reduction in requirement for narcotic drugs. We feel, however, that this potentiation is an additional beneficial effect to be derived from chlorpromazine. The principal beneficial effect was undoubtedly the tranquilizing effect, and these patients without exception slept and ate much better than they had before chlorpromazine therapy was begun.

The patients followed up in this study have been continuously on chlorpromazine for periods varying from one to fourteen months. In this small series we have seen no adverse reactions to chlorpromazine. Three elderly patients were excessively drowsy on the original dose. Several other patients in the older age group found that after continuous administration of the drug for some weeks they tended to be somewhat drowsy. The dose of the drug has been reduced in these patients, but no indication has been found for discontinuing its use. The mental outlook and emotional status of the majority of these patients have been markedly improved. The exceptions have been so rare as to be outstanding. In several cases where the patient herself felt that the drug was not of great benefit, her family made a point of obtaining further supplies after the patient was without the drug for a short period. We feel that this indicates that the patient's emotional status, at least, was better when the drug was employed. The use of the drug was temporarily discontinued in the cases

of two in-hospital patients with widespread metastatic lesions of the bone, and pain of utmost severity. These patients were concurrently receiving considerable doses of Levodromoran, and in each case we were forced to resume the administration of chlorpromazine within 48 hours due to deterioration of the patient's morale.

Many of the patients referred to in this study were under treatment by radiotherapy at the time they were first given chlorpromazine. In these patients chlorpromazine has proved to be of value in controlling radiation sickness and maintaining the patient's appetite during the course of radiotherapy.

We would conclude from this study that chlorpromazine is a useful adjunct in the control of intractable pain. Unfortunately the group of patients studied is too small to draw any definite conclusions with regard to complications of prolonged therapy on such a scale with this drug, and we are aware that in a larger series it is probable that such complications would occur. We feel, however, that the circumstances in which these patients find themselves warrant the use of chlorpromazine under proper medical control.

We would like to thank Poulenc Limited for the supply of chlorpromazine which was used in this study.

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BIRTH INJURY OR ARTEFACT?*

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IN THE DEPARTMENT OF ANATOMY of the University of Saskatchewan a stillborn male child has been kept intact for nine years, fixed in formaldehyde solution. When the anatomy museum was being reorganized, it was decided to carry out a median section of the specimen for exhibition. The body was frozen for four hours in a mixture of solid carbon dioxide snow and ethyl alcohol, and then sectioned cranio-caudally with an electric band saw. The section was not exactly in the midline. The smoothness and consistency of the cut surfaces proved that freezing had been complete and that the band saw had caused no distortion of the specimen.

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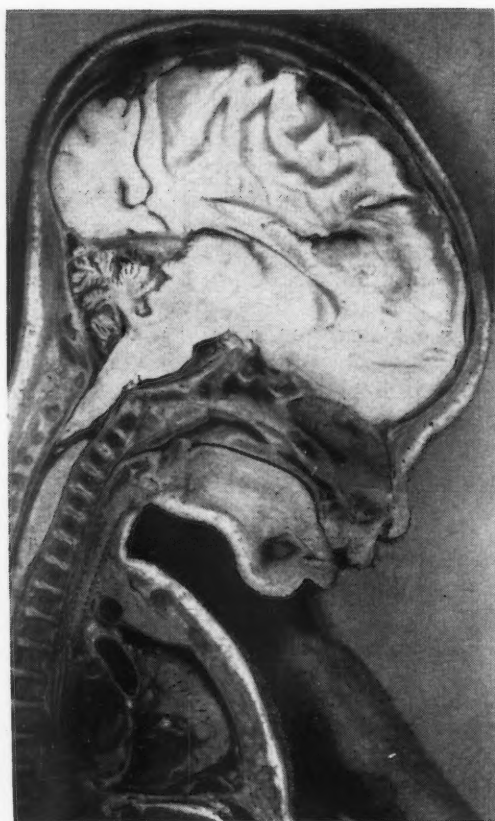


Fig. 1

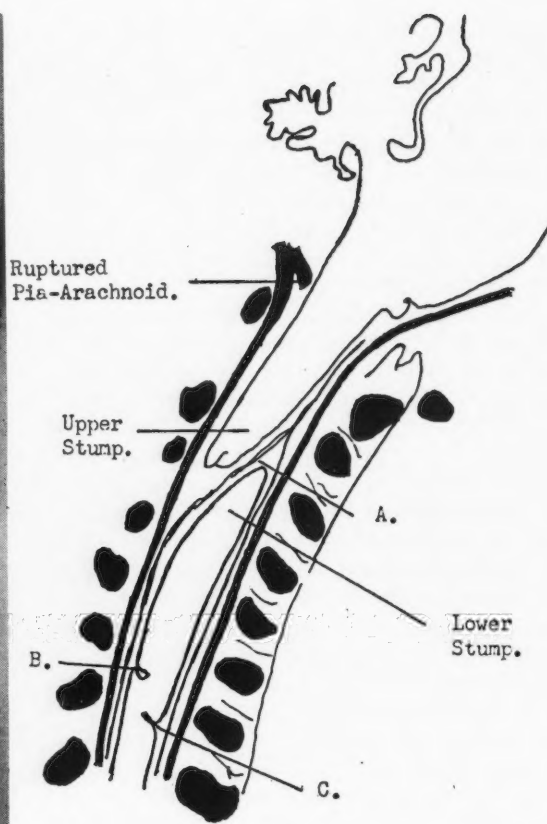


Fig. 2

Fig. 1.—Photograph of specimen (about $\frac{1}{4}$ size of actual specimen) and enlargement to $\times 2$.
Fig. 2.—Tracing of enlargement in Fig. 1.

The spinal cord in the cervical region was completely and obliquely interrupted (Figs. 1 and 2 A). Below this were two incomplete clefts in the anterior and posterior position (Figs. 1 and 2, B and C). The spinal cord, together with its membranes, was removed with great care up to approximately 1 cm. above the interrupted area. The distal stump below the complete cleft was attached to the membranes by nerve roots while the proximal stump was not.

I found difficulty in reaching a final decision as to the mechanisms involved. In spite of these difficulties it is thought worth while to report the case, which has several interesting aspects.

CLINICAL HISTORY

The hospital notes of this case are very incomplete. A primiparous woman of 24 years was admitted to the hospital at 5:45 a.m. on October 31, 1945. From the records the duration of labour before admission is not evident. She was estimated to be pregnant for $7\frac{1}{2}$ months and was in good general condition. The maternal pulse rate was 100, temperature 98° F. and respiration rate 20. The blood pressure was not recorded. The child presented by the vertex in the right occipito-anterior position. The fetal heart was not heard. The membranes were intact.

Four hours later there was profuse vaginal hæmorrhage. In the absence of albuminuria, cedema or abdominal pain, a diagnosis of placenta prævia was made. The fetus was judged to be dead and at this time the maternal hæmoglobin concentration was 48% (7.4 g. per 100 c.c.).

Thirty minutes later the membranes were artificially ruptured and Vorhees bags were inserted. No weights were applied to the bags. Four hours later a stillborn child of 5 lb. 1 oz. was delivered per vaginam. The following day, the blood pressure was 120/84.

These records are obviously incomplete but, so far as one can tell, there was no evidence of a toxæmia of pregnancy or of excessive manipulation during the first and second stages of labour. Version was apparently not attempted nor was there any record of instrumental delivery.

Description of the Specimen.

The child is a male of approximately 32 weeks' gestation as estimated by the appearance and measurements. (Crown-rump length 287 mm. and crown-heel length 437 mm.) The fingernails have almost reached the fingertips while the toenails are less fully developed. Lanugo is present. Fixation has caused little external shrinkage. There are no external signs of nervous, bony or muscular deformity. The lungs, heart and intestine are anatomically normal. At the level of the third and fourth cervical vertebræ there is a complete interruption of the spinal cord which runs upwards and forwards (Fig. 2 A). Some membranous material passes between the upper and lower stumps and appears to be derived from the pia-arachnoid. The dura mater is present in the normal position above and below the cleft, but the pia-arachnoid is absent above and behind

up to the level of the foramen magnum. An incomplete cleft, apparently due to an infolding of the white matter, is seen posteriorly at the level of the interval between the sixth and seventh cervical spines (Fig. 2B). A similar cleft is seen anteriorly at the level of the first thoracic vertebral body (Fig. 2C). Below the incomplete clefts the spinal cord is of normal thickness. Because of the prolonged fixation and consequent loss of colour, naked-eye examination does not show whether there had been any meningeal hæmorrhage. The vertebral column appears perfectly normal.

Microscopic Findings.

1. Region of the complete cleft (Fig. 2 A)

The upper stump consists of medulla oblongata and in it the cells of the inferior olive are clearly seen. In the marginal areas, especially at the level of the first cervical vertebra, the neuroglial nuclei are elongated and more crowded together than is normal. This suggests marked compression, which almost certainly occurred before fixation. The roots of the accessory and hypoglossal nerves are seen on the anterior surface of this stump. No nerve roots are seen posteriorly. Well-developed nerve cells are seen in both upper and lower stumps. Around the central canal in the lower cervical region are some vessels with marked perivascular fluid collections suggestive of oedema. Within the complete cleft are nerve roots apparently derived from the slope of the lower stump.

2. Incomplete clefts (Figs. 2 B and C)

These represent infoldings of the white matter due to compression. In the depths of the anterior cleft (Fig. 2C) there is a mass of convoluted blood vessels which must have been invaginated from the pia mater.

3. Thoracic region.

The spinal cord here is perfectly normal without distortion and without reduction of white or grey matter.

4. The lungs are unexpanded.

DISCUSSION

Three possible causes of the spinal cord abnormality may be considered: (1) An artefact. (2) A congenital malformation. (3) A lesion due to birth injury. Van Gieson¹ in 1892 reviewed the literature on abnormalities of the spinal cord attributed to developmental errors or to disease processes. He pointed out the great ease with which artefacts of such a delicate structure as the nervous system could be produced during removal from the body. He was able to produce apparent reduplication and heterotopia of grey matter by deliberate injury to the spinal cord during removal from the vertebral column. In the present case no such injury occurred. The specimen was completely frozen and then sectioned with a smoothly running thin band saw. Further, since the direction of section was craniocaudal, the action of the saw would not have caused displacement of the pia-arachnoid in the direction in which it has occurred. An artefact can reasonably be excluded in this case, even by the rigid standards of van Gieson.

A true congenital abnormality may be excluded with certainty, since above and below the clefts the spinal cord is normal. Further, it is very unlikely that such a gross developmental error could be present in the central nervous system when the remainder of the fetus was completely normal. One must consider as especially significant the normality of the vertebral column and the upper limbs.

There remains only the possibility of a birth injury. Since there must have been a delay in transporting the body to this department and in subsequent fixation, it is difficult to see how the nervous cellular detail could be so clear unless the child had died later than the clinical history suggests, i.e. eight hours before delivery. The lungs are unexpanded and the child was certainly stillborn. The lesion is high enough to have caused immediate death.

The nature of the abnormality and the microscopic findings suggest that torsion of the spinal cord occurred with rupture of the cord and the pia-arachnoid. Torsion and traction may have occurred during delivery of a shoulder, probably followed by compression after relief of the traction. The position of the pia-arachnoid within the complete cleft and the formation of the incomplete infolded clefts suggests that axial compression of the cord did occur. This explanation is supported by the fact that the medulla oblongata is herniated downwards and backwards into the vertebral canal and through the pia-arachnoid. It is interesting that such gross nervous damage could occur with so little gross evidence of hæmorrhage and without apparent damage to the vertebral column. Presumably the highly elastic and mainly cartilaginous character of the vertebral column must explain the latter.

SUMMARY

A case of a high central nervous system lesion is described. The possible causes are listed, and the probability of birth injury is suggested.

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ACQUIREMENT OF NEOPLASTIC CHARACTERISTICS BY CELLS

From the Sloan Kettering Institute for Cancer Research (*Science*, 124: 127, 1956) comes an interesting report of neoplastic changes developing in epithelial cell lines from normal persons. These human epithelial cells came from liver, kidney and conjunctiva. After 50 passages in tissue cultures they had developed characteristics commonly associated with neoplasia. For example, on subcutaneous implantation to the forearms of volunteers with far advanced cancer, they produced a neoplasm within a matter of days in the majority of instances.

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THE STAPHYLOCOCCUS AND THE HOSPITAL

At the C.M.A. Annual Meeting in June, Sir Howard Florey suggested that we ought to raise our medical hats to the staphylococcus, because it is one of the most remarkable of the organisms which can cause acute inflammation. Sir Howard was of course referring to the remarkable talents of the organism for defeating all attempts to control it. The article by Dr. Starkey which opens this number of the *Journal* emphasizes the difficulty of controlling staphylococcal infection, particularly in hospitals which, according to Florey, "are liable to be bacteriologically dirty places". Dr. Starkey points out that the reason why the staphylococcus has not been taken more seriously in the past is that it does not often give rise to dangerous or dramatic infections. In fact, Sir Alexander Ogston, who discovered and named the staphylococcus in 1880, is reported to have always regarded it as "a friendly little chap" until he himself contracted a staphylococcal lung abscess. Roodyn¹ has drawn attention to the fact that in general practice the family unit presents in a miniature and easily studied form the same problems in staphylococcal infection as do the wards of hospitals. But the general practitioner is in a favoured position vis à vis his hospital confreres in that there is by no means as high an incidence of penicillin-resistant staphylococci among the general population as there is in the hospital population. Furthermore, the carrier rate in the nose and on the skin is about a quarter of that encountered among hospital staff and patients. In fact, as Florey pointed out, "there can be little doubt that the prevalence in hospitals at the present time of staphylococci

resistant to antibiotics is due primarily to the fact that the nursing staff, the surgeons and practically everyone who attends to patients may become carriers."

In his lecture, Sir Howard Florey then put his finger on the serious aspect of the problems when he said, "It might not be such a serious matter if only penicillin-resistant staphylococci had to be dealt with, but staphylococci have the remarkable property of becoming resistant to all other antibiotics used in medicine and some of these very easily." Sir Howard then drew the obvious moral that all those practising medicine should take care not to use indiscriminately the powerful drugs now being put into their hands. A considerable knowledge of bacteriology, pathology and pharmacology is obligatory for the intelligent employment of modern therapeutic weapons, he said, and new antibiotics should be used with great circumspection. As regards hospitals, he suggested that it might be necessary to abandon for some years the use in a hospital of a particular antibiotic. Dr. Mary Barber² has made a similar suggestion, and advised the working out of a system of rotation of antibiotics in each hospital.

Discussing the staphylococcal contamination of hospitals, she said that the general practitioner might well conclude that the moral of it all is that he should keep his patients out of hospital. This advice is clearly impossible to follow. What the general practitioner must do is to take all possible steps to minimize the distribution of antibiotic-resistant staphylococci in the community at large. To rely on the drug firms to produce every few months or so a succession of new antibiotics to which the staphylococcus will be sensitive is to evade one's proper responsibility in therapy.

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RADIATION HAZARDS TO MAN

The Medical Research Council of Great Britain and the American National Academy of Sciences have both recently issued reports on the biological hazards of nuclear and other radiations. Both of these reports consider that the effects on human health of nuclear weapon testing are negligible at present, but they both emphasize the hazard from the use of radiation in

medical practice, and they refer particularly to the genetic hazard.

By now it is well known that radiation can produce mutations in reproductive cells, and that the majority of these mutations are harmful to the human race. There is no recovery from genetic changes, and thus there is no "tolerance" or safe dose of radiation, below which genetic changes will not occur, and above which they will. Ideally, therefore, one might attempt to avoid all exposure to radiation, but in practice this is impossible, because we are all exposed to a certain amount of radiation from cosmic rays and other natural sources, and because the advantages of many uses of radiation outweigh the disadvantages. In practice it is necessary to reduce the exposure as much as possible, and to avoid all unnecessary exposure.

An attempt has been made to set a limit to the amount of radiation that might be received by the average human. The average dose received from natural sources (cosmic rays, and naturally occurring radioactive material in the soil and in our body) is about 3 roentgens in 30 years, the latter being the genetically useful lifetime. It is now recommended that the gonads of the average person should not receive more than 10 additional roentgens from conception up to age 30. An exception is made in individual cases, which would include radiation workers. Even these should not receive more than 50 roentgens up to age 30, and 50 roentgens in each succeeding generation, or an average of 100 milliroentgens per week. It will be noticed that this is a modification of the previously accepted value of 300 milliroentgens per week.

What does 10 roentgens mean in actual practice?

The following table gives examples of the gonadal doses delivered during some diagnostic procedures.

| X-ray examination | Dose (milliroentgens) received by the gonads | | |
|------------------------|---|--------|-------|
| | Male | Female | Fetal |
| Teeth..... | 4.75 | 0.8 | 0.8 |
| Chest..... | 0.36 | 0.07 | 0.07 |
| Gallbladder..... | 1.8 | 15.6 | 15.6 |
| Pyelogram..... | 486 | 1,290 | 3,210 |
| Pelvis..... | 1,100 | 210 | 800 |
| Hip, femur..... | 710 | 210 | 800 |
| Sacro-iliac joint..... | 129 | 713 | 2,700 |
| Pelvimetry..... | — | 1,280 | 2,680 |
| Leg, foot..... | 3.5 | 0.6 | 0.6 |

From the table it is obvious that radiographic examinations in the region of the pelvis contribute the greatest portion of genetically significant radiation. At the same time it should be pointed out that examinations of extremities can deliver larger gonadal doses than those listed above, if poor techniques are used. It should also be realized that the dose from fluoroscopy can be very large.

Taken all in all, it is estimated that the average person in the United States receives from medical radiological examinations a total accumulated dose to the gonads of about 3 roentgens by the time he reaches the age of 30, and presumably this figure is not much different in Canada. It has already been pointed out that 10 roentgens has been recommended as the average upper limit, but this is not to say that any figure less than 10 is safe. Geneticists repeatedly say: "Keep the dose as low as possible."

Every person who operates an x-ray machine should therefore consider the following recommendations.

1. X-ray examinations should be used only when absolutely necessary. Routine pelvimetry and routine fluoroscopy of infants are undesirable practices. Radiation used to produce temporary sterility or as a stimulant in the treatment of infertility should be condemned as unethical.

2. When x-rays are used, every effort should be taken to reduce the dose to the patient as much as possible. Radiographic techniques can often be modified to reduce the dose considerably.

3. Where it is practicable, the gonads should be shielded to avoid unnecessary exposure.

4. The patient should be questioned about previous exposures so that his accumulated dose can be estimated.

The possibility of adverse genetic effects cannot be dismissed as being inconsequential or of no practical interest. It is the responsibility of our generation to protect our germ plasm for our descendants. The medical profession has the chief responsibility in this; let us therefore seriously consider this problem, and take the necessary steps to solve it.

F. D. SOWBY

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Editorial Comments

MALPRACTICE

In a recent issue of the *Journal of the American Medical Association* (161: 442, 1956) Dr. Joseph F. Sadusk, Jr., reviews the experience from 1946 to 1954 inclusive of Alameda-Contra Costa Medical Association with its group malpractice insurance plan. The article will repay study for information about the important and the unimportant circumstances surrounding threats and suits against doctors and about the principles which guide the California group as it gives assistance to its members.

The California group concludes that the age of the physician-defendants, the sex, the geographical area of their practices and whether they do general or special practice are not determining influences on their liability to suit. Their liability did seem to be influenced by the type of medical services they offered; surgical services exposed the doctors to the greatest risks and, surprisingly, obstetrics and gynaecology was the sub-specialty with the greatest risk; work done in hospitals was more productive of complaints than work done outside; some physicians, a very small minority, seemed to be malpractice-prone.

The California group's experience is interesting and some of its conclusions undoubtedly are applicable in Canada, but there can be some doubt whether all their conclusions are valid here. The criteria of membership in the group are not made clear. It is said that "any member of a constituent county medical association may apply for coverage", but it is not made clear whether all applicants are accepted—whether, for example, a doctor with one, or two, or three or four previous claims would be accepted.

One of the two principles "from which this program has never deviated" raises some doubts. Some trained, experienced persons must be in charge of such a scheme, and in California the control is in the hands of a committee formed by the insurance carrier, legal counsel, and a carefully selected medical group. That this management committee should decide which cases are indefensible so that just and prompt settlement may be reached is acceptable; about indefensible cases there usually can be little argument. For that committee to assume the functions of a court, however, thereby possibly denying justice either to the patient-plaintiff or the doctor-defendant cannot be accepted as easily. This the committee does. "If negligence or malpractice on the part of the physician appeared to be present . . . just and prompt financial remuneration would be made to the patient." Surely the decision about whether negligence or malpractice actually is present in those cases where it "appear[s] to be present" is the function of a court where, and only where, both sides of a problem can be exposed and

judged. Malpractice and negligence are not precisely determinable entities; they are variable, intangible, comparative standards. Such things, when there is doubt about them, should be submitted to courts for decision.

The interminable time—to the doctor—that elapses from the time of a complaint to the end of a case seems to be longer, usually, in California than in Canada as far as can be inferred from the report. It is hard to be sure exactly what the report means by "latent period", which it defines as the time "between the occurrence of an incident and the filing of a malpractice suit" because, previously, an "incident" is defined as "either a formal suit that has been filed or a complaint in which \$100.00 or more was paid to settle" but if, as is implied, the "latent period" means the time that elapses between the alleged malpractice and the filing of the suit, that latent period is much longer in California than in Canada. Apparently the California Medical Act does not contain any Statute of Limitations which, in all but two Canadian provinces, forces plaintiffs who wish to bring actions against doctors to do so within one year of the time the alleged malpractice occurred.

It is said that there is an "increasing tendency of juries to award more frequent and higher judgments". In Canada there are higher awards but not "more frequent judgments" if by that is meant more frequent judgments adverse to doctors. The reason perhaps lies in the fact that in Canada many cases are tried by judges rather than by juries; many provinces allow trial before a judge without a jury where the matters to be heard are of a complex or scientific nature which an untrained person might not be expected to comprehend.

No mention is made in the California report of the influence of one local circumstance that occasionally seems important in Canada. Repeatedly it has seemed evident that a flurry of actions against doctors and hospitals in a district or city followed a large judgment against a doctor or a large settlement made for one. One claim, in such a district, fought and won, followed by collection of the costs if awarded and if a plaintiff is financially able to pay them, seems to do more to stop nuisance claims than any other single course of action.

It is an interesting speculation whether or not the California group might find their program more successful if they adopted the principle that every case, not indefensible, should be defended. Fewer claims against doctors are made if people are aware that they will have to prove their claims. Less easy to prove is the value of such a principle in educating the malpractice-prone doctor about his medical and legal responsibilities, a difficult problem mentioned by the California group. Observation, however, leaves the impression that there is less malpractice among doctors who know that settlements will

not be made for them, who know that if they expose themselves to claims they will have to defend themselves against them. A settlement is an easy way out for the doctor; a defence, even if successful, is a stern lesson and one that is not easily forgotten. T.L.F.

HERPES SIMPLEX

In a recent lecture to the Royal College of Physicians in London, Brain¹ reviewed the various clinical manifestations of infection by herpes simplex virus. Primary infection usually occurs in young children between one and five years, being more rare in those under one year. The most frequent primary manifestation is acute stomatitis, which may be severe enough to interfere seriously with feeding. It is probable that many of these cases are missed in the absence of virus studies, especially as the organisms of Vincent's angina may also be present. It is often possible to trace the origin of these cases to a member of the family with recent labial herpes. On recovery, the virus is rarely eliminated from the body, but persists in a latent form for the life of the individual. This virus may be reactivated at any time, giving rise to labial herpes. Serological surveys show that about 60% of the population has antibodies. The virus is therefore a very successful parasite infecting a large proportion of the human herd for most of their lives. It has been found that primary infection is rare in people over five years, possibly because of the greater thickness of the buccal and skin epithelium in older people. Burnet² found that the incidence of infection varies with social class. In Australia 93% of adult hospital patients had antibodies to the virus, whereas only 37% of the more well-to-do class represented by medical students did so.

Other common primary sites of infection are the eye, the genital regions and any area of damaged skin, for example a cut, a burn, a diaper rash or an eczematous area. Primary infection may be very severe with spread of virus in the blood stream. It is particularly severe when it occurs in infants who lack passive immunity from their mothers. Fatal cases with lesions in the liver, adrenals and central nervous system have been described.³ A serious but rare complication is meningo-encephalitis. In a series of 854 cases of aseptic meningitis reported by Adair *et al.*,⁴ herpes simplex was diagnosed six times. Other manifestations of central nervous system involvement are less well established. Wyllie¹ described a case of a boy who suffered from recurrent herpes and at the same time cranial nerve palsies. Also Behrman and Knight¹ have described three cases of trigeminal neuralgia possibly due to herpes simplex infection.

Recurrent herpes occurs around the site of primary infection, usually on the lips as a cold sore or fever blister. The cause of recurrence is imperfectly understood, although a variety of stimuli such as fever, trauma, exposure to cold or sunlight and emotional disturbances are effective. This important subject is worthy of more investigation, and might be approached by the study of the virus growing in tissue cultures *in vitro*.

A particularly interesting manifestation of herpes simplex infection is eczema herpeticum. This is one variety of Kaposi's varicelliform eruption first described in 1887. It usually occurs as a primary manifestation of infection in eczematous children, and a history of contact with a sufferer from recurrent herpes can usually be obtained. Occasionally a patient with recurrent herpes will contaminate his own eczematous lesions.⁵ Eczematous patients should therefore be nursed with barrier precautions and the possibility of viral infection (herpes simplex or vaccinia) should be borne in mind in addition to bacterial infection. Also these patients shed large amounts of virus into their environment and represent a danger to their contacts. Many cases of transmission of infection to the attendants are now on record.⁵ Cortisone may be used in the treatment of the eczema, but its use is contraindicated if herpes simplex infection supervenes, since in common with other infections herpes simplex is definitely aggravated by this hormone.⁶

The laboratory diagnosis of herpetic infections can now be readily achieved. In some cases direct microscopical examination of scrapings from the lesions is helpful. Characteristic giant cells, sometimes showing intranuclear inclusions, are seen in cases of herpes simplex.⁶ They are also seen in chickenpox and zoster but not in other diseases. Extracts of skin lesions may be used in complement fixation tests with herpetic antisera.⁸ These diagnostic methods though rapid are not very sensitive. Virus isolation is far more sensitive, and by use of modern tissue culture methods may be achieved in less than 24 hours.⁵ Stained tissue cultures reveal characteristic giant cells with intranuclear inclusions that enable a presumptive diagnosis to be made. The virus can later be identified by serological means. Antibody studies can also be done using either virus neutralization or complement fixation tests. These tests, although very valuable, can only enable a retrospective diagnosis to be made.

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Medical News in brief**RESIDUAL STONE IN THE
BILIARY DUCTS**

Choledochotomy for removal of stone from the common bile duct is becoming more efficient, but it is reported that residual or overlooked stones remain in 10-25% of all common ducts explored. A recent survey at the Vancouver General Hospital by Thomson (*Surg., Gynec. & Obst.*, 103: 78, 1956) disclosed an incidence of 11% of residual or missed stone. At 34 secondary common duct explorations there were three deaths. Dr. Thomson therefore considers the problem of postoperative residual stone as a very common and serious one. A detailed study of 39 cases in which residual stone was present led to their classification in two categories: (1) Those in which pain recurred after cholecystectomy, often with jaundice. (2) A minority of cases in which the diagnosis was made by postoperative cholangiographies through a T-tube. Dr. Thomson urges the increased use of operative cholangiography which may be undertaken either diagnostically before the duct is explored, or as a control after exploration. It is a much better method of exploring the duct than is supraduodenal palpation, irrigation and probing.

**PRIMARY ATYPICAL NONBACTERIAL
PNEUMONIA**

Primary atypical nonbacterial pneumonia first received attention in 1934 and opinions of recent years have been divided on the efficacy of antibiotic therapy in these cases. Wolf and Brown of the U.S. Naval Hospital, Bainbridge, Maryland, (*A.M.A. Arch. Int. Med.*, 97: 593, 1956) made a controlled study of the efficacy of such therapy in 118 cases. The criteria for diagnosis of primary atypical nonbacterial pneumonia were, as usual, a clinical history of respiratory tract disease of gradual onset with cough, fever, chilly sensations, etc.; minimal pulmonary physical signs; extensive pulmonary involvement as shown roentgenographically; absence of cultural or serological evidence of known bacterial or viral agents as a cause. The patients were young males assigned at random to various groups receiving either no specific therapy, or chlortetracycline, erythromycin, oxytetracycline or tetracycline. Study of the results convinced the investigators that none of these antibiotics altered the duration of the pneumonitis.

**EFFECT OF ANTICOAGULANT
THERAPY ON BONE REPAIR**

A New York group (*J. Bone & Joint Surg.*, 38A: 270, 1956) suggest that anticoagulant therapy may interfere with bone repair. They studied healing of bone autografts in rabbits and dogs given heparin and dicoumarol and in controls. Interference with bone repair was most marked when both drugs were given right after operation, but either drug would delay healing or lead to fibrous union. It is not certain whether these findings would apply clinically.

BONE LESIONS IN SARCOIDOSIS

Sarcoidosis is a sufficiently common problem in practice to require consideration in differential diagnosis. Stein and his colleagues from Philadelphia (*A.M.A. Arch. Int. Med.*, 97: 532, 1956) have made a study of 175 patients with sarcoidosis and find that there is a high prevalence of skeletal lesions in the hands and feet. Almost one in five of these patients showed bone changes on x-ray of hands and feet. The lesions were of three categories: single or multiple, rounded or oval radiolucencies in the epiphysis surrounded by normal bone, diffuse thinning of the cortex with widening of the medullary portion of bone, or mutilating lesions with bone destruction. The lesions were commonly asymptomatic. Their importance lies in the fact that they do not occur in tuberculosis, histoplasmosis and berylliosis—diseases which commonly produce histological and clinical changes elsewhere resembling those of sarcoidosis. Routine roentgenographic study of hands and feet for patients in whom sarcoidosis is suspected is strongly recommended.

**SKIN REACTION TO INTRADERMAL
HYDROCORTISONE**

Atkinson and his colleagues from Cincinnati (*A.M.A. Arch. Path.*, 62: 8, 1956) comment on the reaction of normal human skin to the intradermal injection of hydrocortisone. They show on the basis of experimental observations that the hormone has a paradoxical action when injected intradermally. It apparently produces local tissue damage with appearance of numerous basophilic granules among the injected hormone crystals. It also however improves pre-existing disease processes by suppression of the inflammatory reaction of the dermal connective tissue. This suppression of inflammation extends not only to previous disease processes affecting skin (hence the therapeutic effect), but also to the local tissue damage caused by the hydrocortisone itself.

CYCLOSERINE IN TUBERCULOSIS

Ravina and Pestel of Paris (*Presse méd.*, 64: 1241, 1956) report results of the treatment of 80 cases of pulmonary tuberculosis with cycloserine over a period of ten months. Administration began with use of one to two 250 mg. capsules daily, increasing the dose progressively to four to six capsules. The action of cycloserine appeared to be less rapid at the onset than that of isoniazid or streptomycin, but more prolonged. Final results showed 60-75% of cases definitely improved, among those with chronic cavities which had previously resisted the action of the classic antibiotics. The combination of cycloserine with isoniazid might be useful. The chief complication was convulsive disorders, so that the authors suggest taking an electroencephalogram before putting patients on this drug. Patients should at least begin a course of cycloserine in hospital.

(Continued on advertising page 47)

REVIEW ARTICLE

APPRAISAL OF CAUSES AND TREATMENT OF VENOUS ULCERS OF THE LEG

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CHRONIC AND RECURRING ULCERS of the lower leg associated with varicose veins, phlebitis, or some other abnormality of the venous system and not due to specific local injuries, infections, neoplasms, or to generalized conditions such as arteriosclerosis or blood dyscrasias have been as hard to name as to cure. They produce much morbidity, nuisance and discomfort, often making life miserable. Recently an excellent article by Cockett,¹ entitled "Pathology and Treatment of Venous Ulcers of the Leg", has emphasized the importance of incompetent perforating veins of the lower leg in these patients. It is the purpose of this paper to correlate Cockett's findings with those of others to form a composite picture of the underlying pathological anatomy and physiology of this condition and to rationalize its treatment.

Cockett has revived the term "venous ulcer" for these lesions instead of varicose, stasis, post-phlebitic, or lymphoedematous ulcer. Fifty-two per cent of his cases were associated with incompetent superficial varices without any evidence of phlebitis, 21% were related to a definite deep phlebitis, 27% were not related definitely to either varicose veins or deep phlebitis but made up a third group in which Cockett felt there had been an unrecognized thrombosis of the calf and lower leg veins. By anatomical, venographic and venous pressure studies he demonstrates the close relationship of incompetent perforating veins of the lower leg to lower leg ulceration. He has shown that the veins of the soleus, where thrombosis commonly starts, are intimately connected with these perforators. He postulates that the communicating veins are often rendered incompetent by deep thrombosis and in this way act as a chief cause of chronic and recurrent lower leg ulceration. He emphasizes the necessity for the ligation of these perforators if recurrent ulceration is to be avoided, no matter what other measures are taken, such as vein ligation, excision, stripping, or excision of ulcer and scar tissue with skin grafting.

Cockett's stress on the perforating veins of the lower leg is timely. Though it has been taught for a long time that very careful assessment of the venous status of a varicose or postphlebitic limb is necessary to find all the incompetent veins and their perforators in thigh and leg, and although it is well established that all these veins should be carefully and thoroughly dealt with,

there are still many who leave one or other group of varices untouched. The communicating veins are missed especially, because of inadequate pre-operative assessment and because surgeons persist in making "peep-hole" incisions. This inevitably leaves deep subcutaneous epifascial or subfascial veins and perforators. For example, vein stripping, which has become popular again and is useful in many cases, is good only if adequate incisions are made at groin, knee, ankle, etc., and wherever branches or perforators are found or suspected, so that deep connections are visualized. One frequently, on exploring deep to the obvious superficial veins, finds communicating or subfascial veins that, if left untreated, would lead to early recurrence. Elliot² in this journal recently summarized this aspect of the problem excellently.

One group of veins is forgotten in the discussion of superficial, deep and communicating or perforating veins. The intermediate epifascial, subfascial and muscular veins are frequently varicose and incompetent. As seen during "modified Kondoleon" operations they are quite capable of continuing incompetent communications between superficial and deep veins forming new recurrent varicosities, to the chagrin of the surgeon who has thoroughly excised superficial and perforating veins.

But how are these venous abnormalities related to venous ulcers? The key to the understanding of this problem is the sequence of pathological, anatomical and physiological changes in veins, lymphatics, arterioles, skin, subcutaneous tissue, fascia and muscle that occur in lesions ranging from simple varicose veins, through uncomplicated long and short saphenous incompetent varicosities, to the complicated stage of these varices and the postphlebitic limb.

In simple varicose veins there is some venous stasis resulting in increased pressure on the venule side of the capillary loop, reduced blood flow in the capillary bed, and increased lymph, laden with increased protein, in the tissue spaces. This state, if prolonged and marked enough, as in gross incompetence of the long or short saphenous venous systems, leads to fibrous tissue proliferation in the region of greatest stasis and greatest venous pressure, namely the lower leg. Fibrosis accentuates stasis in veins and lymphatics. The arterioles supplying the skin and subcutaneous tissues are smothered in scar so that the skin is deprived of nutrition and infection is liable to occur. There is slow healing after minor injury, which in turn leads to more scar tissue. The skin and subcutaneous tissues often exhibit pigmentation from degeneration of red cells leaking through capillary walls, or extruded through small vessels under stress from increased intravascular pressures. The full-blown picture is of thin, scarred, atrophic, pigmented, ulcerated skin and indurated, avascular, scarred

subcutaneous tissues extending sometimes subfascially to muscle or periosteum.

Venous incompetence tends to become more marked as more valves are destroyed, or are made useless by valvular deformity or by distension of veins. Blood tends to run toward the foot in the superficial veins and outward instead of inward in the communicating veins. The deep veins become more incompetent also unless closed by thrombus not yet recanalized, an event which usually does make them quite incompetent. The normal pumping action of the muscle-fascial envelope tends to be lost, so that even during walking or running the total cephalad flow of blood is slowed, blood tending to flow from deep to superficial veins through incompetent perforating veins. In these circumstances a vicious cycle is set up whereby more venous, venule-capillary and lymphatic stasis takes place, more lymphatics are sealed off, more scar forms and more arterioles are choked by thickening scar. Deformities of foot and ankle may ensue from scarred fascia, tendon and muscle.

Phlebitis is undoubtedly a prominent feature of the leg ulcer complex. The various grades of varicosities differ in the extent of the above changes, but even simple varicosities without any definite history or sign of gross, deep thrombophlebitis may show minor degrees of local phlebitis. This may be seen in the superficial veins, or at operation areas of phlebitis, old or new, may be encountered subcutaneously or subfascially. Thus one pictures even simple varicose veins with some element of phlebitic change producing more valvular incompetence, venous stasis, lymphatic blockage, scarring of tissues or arteriolar insufficiency.

Intermediate to the cases with typical postphlebitic, indurated, ulcerated, lymphoedematous limbs are the cases Cockett speaks of, with some induration, ulceration and lymphoedema of the lower leg, no superficial varicosities and no definite history of a single phlebitic incident.

Finally, in the typical postphlebitic limb, with or without varicosities visible on the surface, all the above changes are present and marked. The phlebitic and lymphoedematous aspects of the picture are usually most marked, however, because phlebitis almost invariably seals off lymphatic channels small and large, from toes to pelvis, depending on the severity and frequency of attacks. The larger lymph channels run along the walls of the larger veins, especially in thigh and pelvis. Here one may see scarred lymphatics with areas of lymphatic dilatation. Once occluded, larger lymphatics apparently do not re-establish their former function and it is doubtful if even small peripheral lymphatics ever become fully re-established. The veins and their valves are of course damaged so that they become more and more incompetent unless plugged by thrombus as noted above. Throm-

bosed veins, if and when they do recanalize, are nearly always anatomically incompetent, although the deep veins in the muscle-fascial envelope may retain some of their pumping action during exercise.

Reflex arterial vasoconstriction, especially arteriolar constriction, is a variable but important factor, particularly in the frank postphlebitic limb. It increases venule-capillary stasis furthering the vicious cycle of lymph stasis, more tissue induration with protein-laden lymph, more fibrosis, more venule-capillary stasis and more obstruction to arterioles which decreases tissue nutrition, particularly that of skin.

Infection is also a variable factor in venous ulceration. Its importance is equivocal, fraught with inconclusive evidence and argument. Bacteriological studies have always yielded some organisms from the ulcer, from affected skin or from lymph. One certainly sees cases in which the patient is undeniably suffering from a specific staphylococcal, streptococcal, or other bacterial invasion; but this is commonly a secondary infection. Streptococcal erysipelas-like infections are seen in lymphoedematous limbs but are uncommonly associated with venous ulcers. Fungus invasions have been postulated by many workers, but fungi are so commonly found on normal skin that it is difficult to incriminate them as a primary cause of ulceration. Apparently some patients do become hypersensitive to bacteria or fungi, but again it is hard to establish this as a primary cause for recurrent and chronic lower leg ulceration. Indeed a remarkable thing about old venous ulcers is how boldly they resist the utterly unhygienic care they often receive.

NON-OPERATIVE TREATMENT

Venous ulcer patients can be kept comfortable as a rule and very large ulcers can be healed sometimes by the application of elastic pressure dressings. Unna's paste is well tolerated generally, but as noted below other dressings may have to be tried. The very elderly, the debilitated and those otherwise unfit for operation may be carried along in this way. Some people just do not want operation and go along for years wearing Unna boots each time the ulcer reopens. However, many patients, bedridden because of huge ulcers and thought too old for operation, have been brought to surgery and restored to a happy and useful life. When varicosities are present, they may sometimes be closed by ligation or excision under local anaesthesia. The injection of sclerosing solution into large incompetent varices without ligation is useless and may cause embolism, while injections into an inflamed postphlebitic lymphoedematous limb may precipitate an ulcer or acute phlebitis.

OPERATIVE TREATMENT

1. *Venous ulcers, varices, no definite phlebitis, minimal secondary changes around ulcer.*—The

essential treatment here is interruption of the vicious cycle of venous-lymphatic stasis by eradication of the varicosities. The ulcer should be closed first by elastic pressure dressings because operation in the presence of an open ulcer invites infection. The veins should be very carefully assessed by Brodie-Trendelenburg, multiple venous tourniquet and bandage walking tests, all the incompetent superficial veins and their communicators being marked. The operation planned should remove all of these veins or effectively close them, but age, the patient's general condition and the foibles of vain females may prevent as adequate an operation as desirable. It must also be recalled that mortality from embolism is statistically more frequent after more radical procedures and with increased postoperative confinement to bed. One prefers to have the patient up the day of operation and home the next. Any residual varices are closed by injection a few weeks postoperatively. Patients are warned that recurrences are common at variable intervals after any type of operation, and that they must report for re-examination at least every six months after all the veins are initially closed, to prevent small recurrent varices developing into large incompetent veins requiring a second operation.

In 1947 this writer published a long-term follow-up³ of primary varicose veins operated on by various methods and by various surgeons. All varices, large or small, appearing after operation and injections had once closed the original veins, were counted as recurrences—unlike some reports claiming a low incidence of recurrence but counting only "large veins of consequence", etc. A variety of patterns of recurrence was noted even after apparently adequate surgery. The main point was that after an adequate operation an adequate follow-up should be done to inject and close new varices as they appeared and thus prevent large recurrent varicosities requiring another operation. During many years of association with a large "varicose vein" clinic the writer saw only six instances of post-injection allergic reactions, all mild and transient, a very few ulcers due to faulty technique, and no cases of deep phlebitis due to sclerosing solution; this in spite of occasional accidental liberties taken with the careful and cautious clinic rules laid down. However, the writer has seen many dreadful postphlebitic legs due to retrograde or other injection of sclerosing solution into veins made during vein operations and has never practised this method.

2. *Venous ulcers, varices, no definite phlebitis, marked scar, etc., lower leg.*—In these cases it is essential to remove or close all incompetent veins and to remove the ulcer area with as much secondary scar as is feasible. Again, open ulcers should be closed by elastic pressure dressings. The area of induration and apparent dense scar decreases remarkably under this treatment and frequently the area actually requiring ex-

cision is relatively small. Bed rest with elevation of limbs above heart level is occasionally necessary. At operation a long linear incision as in the Kondoleon procedure is usual along the medial side of the leg from knee to ankle. The excision of scar should be wide and should extend deeply to muscle and periosteum if necessary. A skin graft replaces the scarred virtually non-viable skin, the excision of subcutaneous scar allowing nourishment of the new skin by arterioles from unscarred tissue. Any incompetent veins are removed or tied in the area. Swollen legs can be considerably reduced in size by the excision of tissue. It is likely that lymphatic flow is helped to some extent; at least a large area of useless scarred tissue favouring venous and lymph stasis and depriving the skin of arterial supply has been removed. This has been termed "removal of the iron curtain". Bed rest up to 14 days is necessary to ensure a perfect skin graft take. Elastic pressure bandages should be worn until the graft has stabilized completely. This writer has found postoperative follow-up essential for closure of new varicosities. Veins reappearing around the graft or beneath it should be closed by injection, careful injection of sclerosing fluid not having been found harmful if properly done in suitable cases. Indeed, recurrent ulcers in or around the graft can be closed by injection and closure of associated varicosities.

3. *Venous ulcers with or without varices, definite postphlebitic leg, secondary changes in leg.*—Superficial varicosities if present should be removed and their incompetent communicators closed. Again, open ulcers, dermatitis or eczema should be controlled before operation to avoid infection. Operation should remove all the scar feasible, as noted above, through a similar long linear incision, and a skin graft should replace as much damaged skin as possible. A large, swollen, indurated, scarred leg may be considerably reduced in size. Postoperative care of veins is again necessary, special precautions being observed in injection of any new veins. Elastic pressure bandages are usually necessary indefinitely for the best results.

4. *Venous ulcer without apparent phlebitis or superficial varices.*—Again, as noted above, the ulcer should be closed or dermatitis healed. A careful search for veins is made before operation. The operation through the same long linear incision must remove all veins and special search is made in deep tissues for intermediate groups of veins and perforators unrecognized previously. All scarred skin and deeper tissues are removed and a skin graft is applied. Postoperative care and follow-up is as above.

5. *Cases difficult to control.*—A certain number of patients with venous ulcer react badly to elastic pressure dressings of any kind, developing red, weeping, excoriated skin with spreading ulceration. A generalized skin reaction may develop due to sensitivity either from the

diseased tissues or from drugs used topically. One has seen this happen with ordinary boracic compresses. When possible, bed rest, elevation of the limbs and sterile saline compresses, perhaps over vaseline mesh, or simply exposure of the limbs to air under a cradle, may result in healing. Ambulant treatment is difficult, sterile normal saline dressings or vaseline mesh under elastic pressure bandages being least dangerous. Occasionally zinc oxide, olive oil, bland ointments such as Nivea Cream, or sometimes simply a dusting powder of corn starch and boracic, will unexpectedly control the condition of a hopeless-looking leg. Intense itching or burning is usually made worse by various local anaesthetic ointments and other topical salves, or calamine and many other lotions, a host of which have been tried and discarded. One after another a multitude of such drugs have been found to produce local sensitivity or an id reaction. Bed rest, elevation of the limbs, sedation, Pyribenzamine and cold normal saline compresses often give relief without doing harm. Sympathectomy or neurectomy have not been consistently useful. The problem frequently calls for the best efforts of a dermatologist.

6. *Infection*.—Infection is usually local, but occasionally erysipelas-like dermatitis is encountered or a spreading cellulitis or a rapid growing ulcer. Antibiotics are useful systemically but their local use may produce an id or generalized skin reaction. Bacitracin, if indicated, is least likely to cause trouble. When the sulfonamides and penicillin were popular, one saw a host of local and generalized skin rashes. Bed rest, elevation of the limb, hot compresses of normal saline or magnesium sulphate or exposure to a heat lamp are usually safe, coupled with an appropriate and safe antibiotic systemically.

7. *Role of Sympathectomy*.—Sympathectomy has achieved popularity several times as an aid in treating venous ulceration. A group done in the early 1930's was studied by the writer some years ago. There was no evidence that any ulcer healed because of the sympathectomy itself, and no ulcer remained healed for long. However, sympathectomy is useful in hyperhidrosis not amenable to conservative measures, especially in cases with macerated skin and possible fungus or bacterial invasion. It is also useful where arteriosclerosis plays a definite part in ulceration. Sympathectomy should be used with caution in the presence of lymphoedema because increased arteriolar flow following sympathectomy increases tissue lymph, which cannot be carried off by damaged lymphatics.

8. *Role of deep vein ligation*.—Deep vein ligation does not seem to rest on a rational basis. Open incompetent deep veins, though valveless, do shunt some blood upward during exercise. The muscle-fascial pump or "venous heart" does not work efficiently with incompetent valves in deep veins or perforators, but obstructing the

deep veins usually increases peripheral venous pressure at rest and during exercise, increases venous stasis, lymph stasis and lymphoedema. Ligation of the superficial femoral vein may completely block the remnants of the major lymphatics as they course along that vein. The writer has seen a number of postphlebotic limbs made definitely worse by deep vein ligation. Furthermore, many studies indicate that incompetent collateral veins rapidly open around a tied vein, offsetting any advantage in its ligation. However, the writer has tied large varicose popliteal veins in the course of dealing with multiple varices, but has always left several large deep veins to carry blood upward through the popliteal space.

9. *"The New Way of Life"*.—Finally the rules that Luke⁴ has laid down as "The New Way of Life" are indispensable in the treatment of patients with venous ulceration.

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A bibliography that would be adequate as a reference for readers and would give due credit to the many outstanding contributors to this subject, would be unwieldy. Therefore readers are referred to the bibliography in Cockett's article and to the four papers mentioned in this paper.

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DETECTION OF ARSENICAL POISONING

In a case recorded by Dewar and Lenihan (*Scottish M. J.*, 1: 236, 1956) a man had been taking for 12 years for "nervous debility" a mixture containing arsenic, phenobarbitone and bromide. He complained of thickening of the skins of his palms and soles during the past four years. Chronic arsenical poisoning was suspected and urinalysis confirmed the diagnosis. However, a further investigation was conducted by activation analysis of tissue samples. A few mg. of hair, skin and nails were taken from the patient, weighed, sealed into plastic envelopes, packed into aluminium cans and sent to the Atomic Research Energy Establishment together with 1 mg. of arsenious oxide in another envelope. The cans were subjected to a neutron flux for a period of 24 hours and then returned. Tissue samples then contained radioactivity due to As⁷⁶, Na²⁴ and small amounts of other isotopes. The arsenic was separated by distillation and assayed in a Geiger counter. The arsenious oxide was treated in the same way and assayed to determine loss of arsenic in distillation. Finally, the arsenic content of each tissue sample was calculated by comparison of counting rates with those given by the standard. The hair was found to contain 65 parts per million of arsenic by this method and the nails 11 parts per million. These figures are abnormally high and indicate the suitability of activation analysis for investigation of small amounts of tissue. The authors regard this technique as a new and important method for demonstrating arsenic in tissues; as little material as a single hair may be used. The method may also be useful as a research tool.

Men and Books

TRUE HEALTH

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IT IS CUSTOMARY for those in preventive medicine to judge the success of their work by the number of years that have been added to man's life expectancy. Measured by this standard, the work of the last 50 years has had unprecedented success, for in that time man has gained 20 years. I would like to suggest, however, that it is now becoming important to assess our success by another standard. This standard would consider the fullness of life as well as its length.

To do this, we must leave for a time consideration of the many and think instead of the individual; a measure of the fullness of his life is the extent of his peace of mind. Man has been seeking this since history was first recorded. I mention it, not to add anything to the wisdom of the ages, but to emphasize that the great progress of science has not made this quest any the less important. If anything, the discoveries of medical science have made us even more aware of the importance of finding inward peace if we would enjoy true health.

Two or three hundred years ago, it must have been difficult to be serene when within the week one might fall victim to plague, cholera, typhus, typhoid, tuberculosis, smallpox, or death in childbirth. In this year of 1956, most of these have been reduced to a negligible risk among us, and yet I doubt if we are any more serene. Now we complain, "How can one be placid in the shadow of cancer, heart disease, accidents, and the hydrogen bomb?" As soon as these become controlled, there will be some new excuse for our turning to the transient pleasures of the world for relief.

One is led to believe that much of our feverish energy is merely an escape from being quiet. As Kahlil Gibran has said: "The silence of aloneness reveals to their eyes their naked selves and they would escape." The answer to our restlessness is not to be found around us but within us. Until we find the answer, we will not enjoy good health in the broad sense of the term.

We know that this inner tension hinders recovery from such diseases as tuberculosis, arthritis, peptic ulcer and heart disease. It is understandable that the health officer, knowing that health is so affected, should be interested in this aspect of it, although this is not usually thought of as one of his functions. With me it is an interest which started while I was in general practice. I had the feeling when I first opened my office door that I was acquainted with most of the ills with which I would be confronted. What I did not know, I felt could be found in the

books. I soon learned that my education was not as complete as I had thought.

When the woman who had "doctored" most of her adult life came to me with her vague and various symptoms, I thought that, with my antibiotics, relaxants, and vitamins I would bring help where the other physicians had failed. After a month I realized that my medicines, potions, and pills were accomplishing nothing. Within myself, I knew that I had failed this woman for I did not know how I could help her. Later I heard from her brother that as a little girl she resorted to temper tantrums when she did not get her own way. As she grew older, her unreasonable outbursts ceased but her immature attitude did not. An adult may gain control of his temper but unless his attitude grows to maturity, the reaction which resulted in the tantrum now may take the form of a physical disorder. This woman had come to me for help, as she had done to many doctors, and I was not able to help her. It was little consolation that no one else had helped her. To this woman I could not qualify as the good physician who "cures sometimes, relieves often, and comforts always". I had not cured her, relieved her, or comforted her.

There were few days in practice that I did not encounter someone for whom I wished to do more, but did not know how. A man in his seventies complained of his asthmatic attacks. The newer drugs offered so much hope that I treated him without paying much attention to his story. Two weeks later he was in again, obviously not satisfied with the results. This time, I did what I should have done the first time; I listened to him. This was his story. He had always been an active farmer who had worked hard, and as far as land and money were concerned he had been a success. Three years previously, his wife had died, and the following year he had retired and given his farm to his son, with whom he had continued to live. He was prepared to enjoy the fruits of his labours when he began having attacks of asthma. Even so, the son and his family were too busy with their work to have much time for the old man. What he needed more than my pills was something for his loneliness. I had nothing for that in my dispensary. He wondered if getting married again might not be the answer; and it might have been. However, a happy marriage of older people is not always easy to arrange. Older people are usually less flexible in the adjustments required in marriage and it can create more difficulties than it solves. Often such people are advised to develop a new interest, but this is not easy either for a man whose chief interest for 50 years has been to make money.

Because I was practising in my home town I knew more about the people I saw than I could have known as a stranger. I had heard about this man from my father and had remembered that

in his quest for money he had shown little feeling for others. I do not mean to criticize the quest for money, but, like any other all-engrossing interest, it is usually pursued at the expense of good family living. This was the example that the father had set for his son. The example was copied by the son, so that he in turn was interested in little other than making money, with the result that he had little time for his father, and little real affection for him.

If preventive medicine measures its success by the serenity of the people it serves, then its record of achievement is not as outstanding as when it confines itself within the limits of life expectancy. In both of the stories I have outlined we can look back and feel that a change in the living pattern of these two people would have allowed them greater contentment in their later years. Thus I learned the importance of finding a good pattern of living. A good pattern will give peace of mind. Much has been written on this subject and some would give the impression that their particular approach is not only the best, but the only way of finding satisfaction. I believe, however, that there are several patterns which may be suitable. The difficulty arises in finding the one that best fits the individual. I do not think that this can be done satisfactorily by someone else. Each of us must search for his own.

How is one to begin the search for a good pattern of living? I would suggest that studying other people and their lives is a good way to start. This study is sometimes limited to the great people of history. For some it is unnecessary to seek beyond the life of the Galilean carpenter. Others start with the lives of lesser men, as recorded by themselves or by history. Still others find inspiration in the lives of men they see around them. I think all these sources can be of value. Nor should we forget that we can learn from those we dislike as well as from those we admire. With the material gained from this search, each of us can build up a pattern of living that is most suitable to himself.

In our search there is one quality that keeps recurring and which in the end will seem to dominate the pattern we make. This is the quality of love. As St. Paul says: "Though I speak with the tongues of men and of angels, and have not love, I am become as sounding brass, or a tinkling cymbal. And though I have the gift of prophecy, and understand all mysteries, and all knowledge; and though I have all faith, so that I could remove mountains, and have not love, I am nothing."

We often think that this quality is limited to love of God and love of one's fellow man, including of course one's family. I do not believe that it is sufficient that love should end there. I feel that it must also include love of one's work. Some of us think that work was forced upon man as a curse and therefore no pleasure is to be

found in it. Some of us think that we could find satisfaction in some other work but that we are unable to find any in what we are doing. Only by giving our best to whatever we have at hand can we hope to find pleasure in it. Kahlil Gibran has said it this way:

Often have I heard you say, as if speaking in sleep, "He who works in marble, and finds the shape of his own soul in the stone, is nobler than he who ploughs the soil. And he who seizes the rainbow to lay it on a cloth in the likeness of man, is more than he who makes the sandals for our feet."

"But I say, not in sleep but in the overwakefulness of noontide, that the wind speaks not more sweetly to the giant oaks than to the least of all the blades of grass;

"And he alone is great who turns the voice of the wind into a song made sweeter by his own loving."

"Work is love made visible."

"And if you cannot work with love but only with distaste it is better that you should leave your work and sit at the gate of the temple and take alms of those who work with joy."

"For if you bake bread with indifference you bake a bitter bread that feeds but half man's hunger."

"And if you grudge the crushing of the grapes, your grudge distils a poison in the wine."

This passage from "The Prophet" emphasizes the importance of loving our work, not only for our own well-being, but for the well-being of our fellow man. We may think that as long as we do a job, we are fulfilling what duty requires of us. The prophet points out that if we do our job with indifference we are being unfair to those who buy the product of our work. The results of this indifference may not always be obvious, but at times they may be not only obvious but disastrous.

On August 4, 1955, an American Airlines plane crashed in Missouri, killing all 27 passengers and three crew members. A meticulous investigation of wreckage revealed that a faulty cylinder had been the cause of the crash. In checking the records, which are kept on every cylinder, it was found that two of the company's rules had been ignored in the installation of this cylinder. Thirty people died as a result of some workman's indifference. Fortunately, the indifference which some of us may have toward our work does not lead to such disastrous results.

The effects of this indifference on our own bodies may not be obvious at first but in the end they may be just as disastrous. Boredom is a very common cause of one of the commonest complaints which the physician hears, the complaint of tiredness. Men go to the doctor seeking a good tonic; but the best tonics do not come in bottles, for they are such things as joy, contentment, hope. Many times have I wished that such tonics could be compounded and dispensed. How easy the physician's task would become then! However, worth-while things are usually not gained easily. It is not the effort that is lacking, for many of us put a great deal of effort into worthless ventures. The difficulty seems to be in

finding the right road and heading in the right direction. If this were accomplished, the effort would result in something worthwhile.

What is the right road? I have already mentioned that I believe there are different roads for different people and each of us must make some effort to find the right road for himself. We should seek guidance in our search but we should not expect that someone else can tell us which is our road. Some experts try this, and some misguided people follow, but seldom does the effort lead to a happy conclusion. From "The Prophet" we read again:

The teacher who walks in the shadow of the temple, among his followers, gives not of his wisdom but rather of his faith and his lovingness. If he is indeed wise he does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind. For the vision of one man lends not its wings to another man.

I do not wish to give the impression that I have found the truth and that if you follow my direction you will find peace of mind. I prefer to think that in my search I may find a truth. In any case it is the search that is important to me, not the finding. So often we set out for a goal with little room in our minds for anything else. We pass by the things along the way that might give us infinite pleasure, in the hope that the sooner we reach our destination the sooner we shall find happiness. However, events may interfere with our efforts, and we become bitter, frustrated or angry that our progress is being impeded. These are the very emotions which, if continued, produce changes in our bodies that lead to ill health. Eventually the ill health itself puts a complete block in our road and makes impossible the attainment of our objective. We have unfortunately come to think that we cannot find happiness short of the goal, and so we are left, a dejected and morose heap at the side of the road. No one offers to help us in our misery, as all hurry by in the mad race to reach their destinations.

Ideally, the search itself should bring the peace. Many of us have acquired the habit of regarding victory as the important thing in the game when actually it is the playing of the game that should give the greater satisfaction. The man who starts out with the sole purpose of making a fortune, seldom does. It is the man who enjoys doing business who finds himself with the fortune. In the same way, the man who starts out with the sole purpose of finding peace of mind seldom does. It is the man who enjoys living a full life who finds himself with peace of mind. The Samaritan who was travelling on the road from Jerusalem to Jericho found time to help the man who had fallen by the way. In doing this he was likely unaware that he was not only helping his neighbour but he was also helping himself, for he was satisfying one of

man's basic needs, the need to feel necessary. The man who does not feel necessary in his job, or the woman who does not feel necessary in her home, must satisfy this need in some other way. Often the other way can feed but half the hunger. Unfortunately, these unhappy people are not aware of this, and they take larger and larger doses of the substitute in the hope that eventually they will be filled. If the hunger is not satisfied, then the mind cannot be at peace, and when the mind is not at peace neither is the body.

I believe that the search for the full life can help us in three ways. First, it gives direction to our steps, and this in itself ends the frustrating uncertainty of a purposeless course. Uncertainty breeds fear, and where there is prolonged fear there can be no health. Secondly, the search involves learning new things, and learning is the most stimulating of our processes. The natural result of this stimulation is enthusiasm, which is in itself one of the best tonics for good health. Thirdly, as our search progresses we make some of the qualities we find a part of our daily living. This will bring us closer to that state of serenity without which good health cannot exist.

I have enlarged upon one of these qualities, the quality of love: love of God, love of man, and love of one's work. If more of us had this quality in greater abundance, it would not be said as it is now that the world's trouble lies in having too many people who want to get and too few people who want to give.

There are lesser qualities to be found which are also necessary. One of these is humour. A philosopher once wrote: "Ten times must thou laugh during the day, and be cheerful; otherwise the stomach, the father of affliction, will disturb thee in the night." Further qualities are humility and self-denial. You will have others to add.

Just as I would not tell another how to furnish his home, so I do not mean to suggest how he should furnish his mind, where he really lives. The search must be our own and we will get no more out of it than we put into it. That nothing lasting could be gained without effort was the basis of Andrew Carnegie's philanthropy. He said: "I choose free libraries as the best agencies for improving the masses of the people, because they give nothing for nothing. They only help those who help themselves. They never pauperize."

The main thought I would leave with you is that the mind and the body are inseparable, and that an unrest in the one causes an unrest in the other. It follows, then, that true health is impossible without inward peace. Therefore, he who would claim an interest in preventive medicine must accept a new standard in measuring his success. No longer is it sufficient to judge a life by its length. One must also consider the fullness thereof.

GENERAL PRACTICE

COLLEGE OF GENERAL
PRACTICE OF CANADA

THE BOARD of Representatives of the College, at its recent June meeting in Quebec City, approved its first official Constitution and By-Laws. This Constitution provides for new membership classifications and has amended regulations governing postgraduate study requirements.

CLASSES OF MEMBERSHIP

1. *Honorary Members.*—Honorary membership may be conferred by the Board of Representatives on individuals of distinction who have made an outstanding contribution to the cause of the general practitioner in Canada or to the medical profession in general, or distinguished members of the College who have retired from practice. Honorary members need not be graduates in medicine and may be proposed by a provincial chapter. Honorary members shall be entitled to the privileges of the floor of the general annual meeting but shall not be entitled to vote. They shall pay no dues, and may not hold office.

2. *Active Members.*—The active members of this College shall be members in good standing of a provincial or component chapter whose names have been certified to the Executive Director and whose dues to this College have been paid, and such other fully qualified medical persons practising in a province or territory where no chapter exists who have been elected by the Board of Representatives pursuant to the following requirements:

Requirements for Active Membership.—(a) Shall have been five years in general practice or its equivalent, (i), (ii), or (iii). (1) A year of internship is equivalent to a year in practice. (ii) A year's assistantship to a general practitioner is equivalent to a year in practice. (iii) A year of an approved residency in general practice is equivalent to two years in practice. (b) Shall have completed in the two-year period prior to application for membership, an amount of postgraduate study equivalent to the amount required in each two-year period for continuing membership as outlined under "Continuing Program of Postgraduate Study". (c) Shall have conducted practice on a high moral and ethical plane. (d) Shall indicate willingness to undertake 100 hours of postgraduate study each two years, as outlined in these regulations under "Continuing Program of Postgraduate Study". (e) Practitioners of thirty years' standing may become members without having fulfilled completely the requisite postgraduate study and may

continue membership without fulfilling the continuing program requirements because of their years of experience. Nevertheless, it will be expected of them that they will show the interest in the activities of the College that their membership implies. (f) Active members will be elected for a period of two years. They will be eligible for re-election if so recommended by the Credentials Committee after a review of the postgraduate study accomplished in the preceding two-year period. (g) Any member failing of re-election to membership, may, at the discretion of the Board of Representatives, be reinstated at a later date if, in the judgment of the Board of Representatives, he has fulfilled the requirements set forth in this section, without being required to pay the admission fee again. (h) A detailed record of the time spent in postgraduate study as well as other credited work shall be furnished annually by the individual members on a prescribed form supplied by and returnable to the Executive Director.

3. *Associate Members.*—(a) Any graduate from an approved medical school who is engaged in general practice, approved internship, or residency who cannot qualify for active membership because of items (a) and (b) under "Requirements for Active Membership", may apply and be elected to associate membership. Associate members shall not be entitled to vote or hold office in the College. (b) Applicants must signify willingness to undertake 100 hours of postgraduate study each two years as outlined under "Continuing Program of Postgraduate Study". (c) Associate members may apply for active membership when they have fulfilled the qualifications for the latter. (d) Associate members who have not qualified for active membership within five years shall cease to be associate members.

5. *Sustaining Members.*—Any member who has ceased the practice of general medicine by entering another field of endeavour and desires to keep his affiliation or to become affiliated with the College. He may not vote or hold office. He has the privilege of the floor at annual meetings. He has no postgraduate requirements and he pays continuing active membership dues.

6. *Active (Exempt) Members.*—An active member past the age of seventy and/or who has been engaged in active practice more than thirty years. He has no postgraduate requirements and he pays the usual dues.

CONTINUING PROGRAM OF
POSTGRADUATE STUDY

Active members in order to maintain their membership, and associate members desiring to qualify for active membership, will be required to carry out a continuing program of postgraduate study as follows: (a) One hundred hours of postgraduate study each two-year period of which at least 50 hours must consist of planned postgraduate courses, or courses by

travelling teams of recognized teachers and attendance at formal medical scientific meetings, such as Canadian Medical Association, l'Association des Médecins de Langue Française du Canada, and divisional meetings. (b) A minimum of 25 hours of this must be, and a maximum of 90 hours may be for attendance at planned postgraduate courses or courses given by travelling teams of recognized teachers. (c) A minimum of 10 hours must, and a maximum of 25 hours may be allowed for attendance at formal medical scientific meetings. (d) Credits toward the other 50 hours may be given for hospital rounds, medical papers submitted or published, planned reading courses, book reviews, case history reports submitted for publication, community health services, etc.

ASSESSMENT OF CREDITS FOR POSTGRADUATE STUDY

(1) The maximum credit for a course is to be hour for hour. It may be less than this but never more. (2) Members should be encouraged to take their formal training elsewhere than where they practise. (3) Attendance at courses by travelling teams of recognized teachers and district and county meetings may be credited toward formal training if approved by the Education Committee of the provincial chapter, under supervision of the Central Education Committee.

HOW ARE THESE REGULATIONS BEING CARRIED OUT?

Members may and should record their studies as they occur on their membership cards which have been planned for this purpose and they are expected to return these cards, along with their dues, to the central office at the end of their membership year when applying for renewal of membership. Further study information may be submitted if this seems desirable at this time. These study record cards will be reviewed after each two-year membership period. This will be done by provincial Credentials Committees and will take a year to complete. In the meantime, and while awaiting the recommendations of the Credentials Committees, the member will be promptly granted renewal membership for that year if he is in good standing.

CORRECTION

It is regretted that in the note on the Trans-Canada Medical Plans meeting, printed on page 242 of our August 1 issue, the chairman's report was incorrectly attributed to Dr. S. A. Orchard. The report was of course given by the outgoing chairman, Dr. H. H. Lees of Windsor, Ont.

THE PRESENT PLACE OF SURGERY IN CARDIOVASCULAR DISEASE*

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F.R.C.S., Saskatoon, Sask.

IT IS JUST 24 YEARS since Gross¹ ligated the first patent ductus arteriosus, 12 years since Crafoord² and Gross³ severally corrected coarctation of the aorta and Blalock⁴ successfully operated on a case of tetralogy of Fallot. It is 30 years since Souttar⁵ operated on a mitral valve stenosed by previous rheumatic endocarditis, although it was not till some 19 years later that the era of mitral valve surgery really began with the work of Smithy,⁶ Harken,⁷ Bailey⁸ and Brock.⁹ Therefore, a pause to assess this relatively short period of stupendous advance seems indicated.

Many types of cardiac surgery are quite unamenable to surgical help. There are others in which the techniques available today are more dangerous than the disease itself. In 1953 Blalock,¹⁰ speaking at the 34th annual session of the American College of Physicians, discussed the problems in cardiovascular surgery. He discussed these in three groups. The general scheme of his classification has been followed with certain modifications and additions to adapt it to suit the purpose of this review, which is to present to the general practitioner the present place of surgery in cardiovascular disease.

Therefore, three groups of conditions may be considered: (1) Those conditions in which surgery is recognized as the treatment of choice. (2) Those conditions in which surgery is indicated but in which further advances in techniques will give better results in the future. (3) Those conditions in which surgery has not justified itself as the treatment of choice at present.

There are two great divisions of cardiovascular disease: (1) congenital lesions, (2) acquired lesions.

It is important to remember that congenital lesions represent abnormal anatomical states, some of which can be completely corrected, e.g. patent ductus arteriosus, or coarctation of the aorta. Others, however, because of deficiency or abnormality of certain essential structures, cannot be completely corrected, at least at present, but may be improved, e.g. tricuspid stenosis, or single ventricle with pulmonic stenosis.

In acquired lesions it is important to remember that the tissues to be dealt with are damaged as the result of the ravages of disease, or aging processes, and therefore complete restoration of function may not be possible. A severely scarred mitral valve, for instance, may be opened up but complete mobility of the cusps may not re-

*From the Department of Surgery, University of Saskatchewan.
A lecture delivered to the College of General Practice, Ontario Chapter, at Toronto, September 22, 1955.

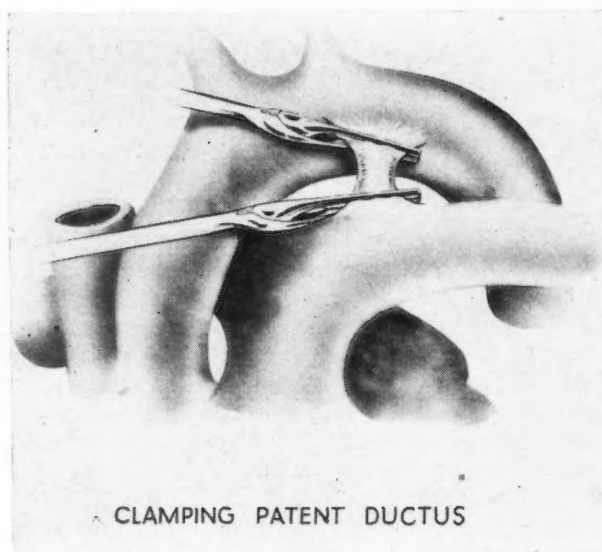


Fig. 1

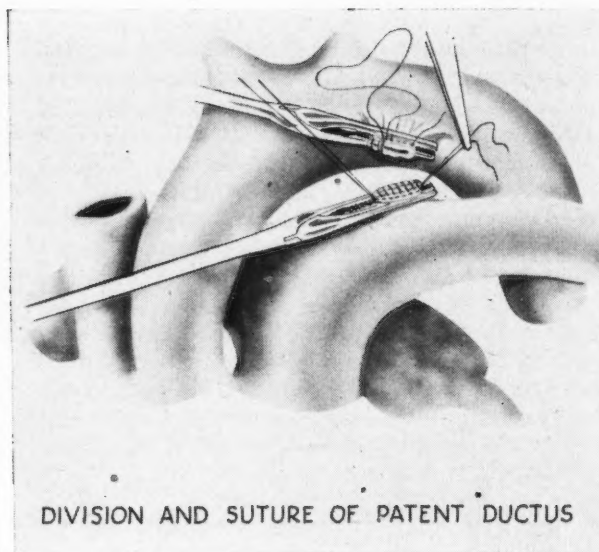


Fig. 2

turn, or a grossly atheromatous iliac vessel which is blocked may be replaced by a graft, yet the vessel above and below is still heavily diseased.

GROUP I. Those conditions in which surgery is recognized as the treatment of choice.

1. Patent ductus arteriosus.
2. Coarctation of the aorta.
3. Pulmonic stenosis.
4. Pulmonary arteriovenous fistula.
5. Anomalies of the aortic arch.
6. Congenital obstruction of the portal vein.
7. Mitral stenosis.
8. Constrictive pericarditis.
9. Wounds of the heart.
10. Systemic arteriovenous aneurysm.
11. Arterial aneurysm.
12. Obliterative disease of the lower aorta and iliac vessels.
13. Portal hypertension without liver failure.

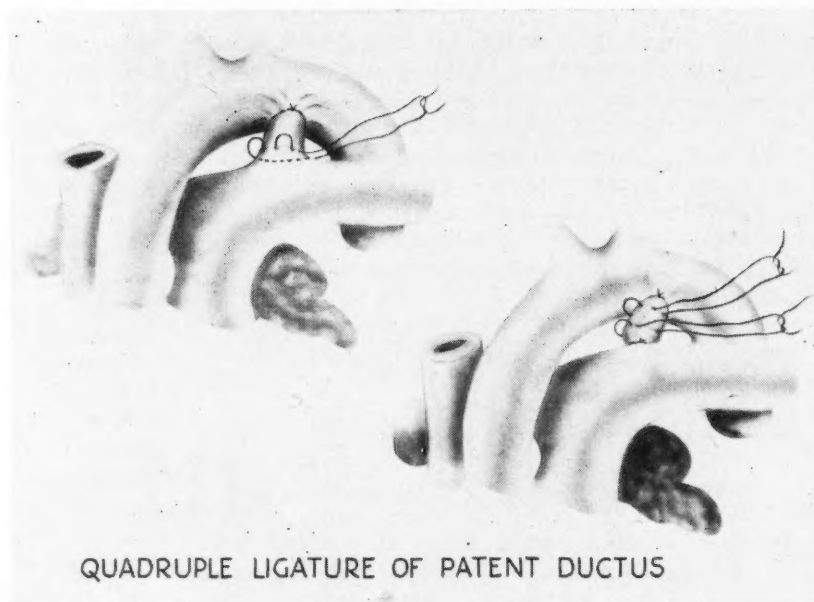


Fig. 3

PATENT DUCTUS ARTERIOSUS

It is generally agreed that all patent ducti arteriosi should be closed, thereby converting an abnormal heart to a normal one. This is one of the most physiological operations known to surgery. Surgery merely does what, for some peculiar reason, nature has failed to do.

In general the operation should be performed as soon as the condition is diagnosed. However, it is probably wise and safe to defer the operation until the patient is two years of age, unless there is evidence of heart failure, in which case the closure should be carried out as soon as the failure is brought under control.

The operation is performed through a left thoracotomy incision, either anterior or lateral. The ductus is closed either by quadruple ligation in continuity or by division between clamps with suture of the divided ends. The former is probably the safer method in the hands of the

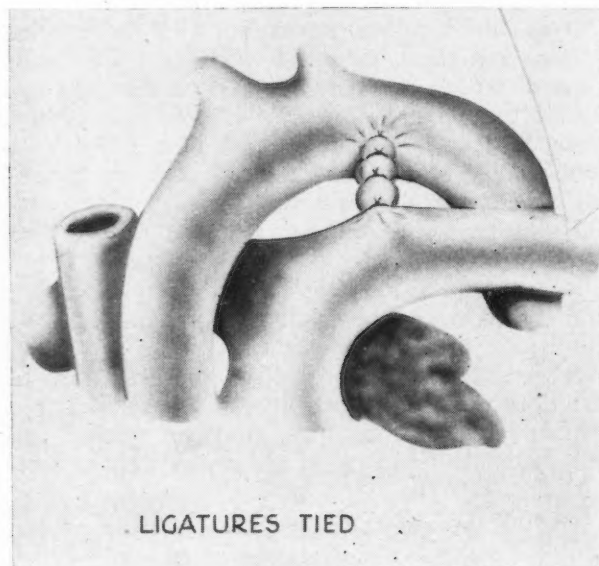


Fig. 4

occasional operator, but the latter is the more definitive. Recanalization may occur with the former method in a few cases, but will not do so with the latter (Figs. 1-4).

If a patent ductus is not closed, the course of the patient's life may be as follows: (1) He may live to a ripe old age. (2) He may develop subacute bacterial endocarditis. (3) He may develop high output heart failure.

The results of the operation are highly gratifying; the mortality rate in good hands should be under 1%.

Two types of ductus should be mentioned because they are atypical. (1) The first is the broad short ductus with associated pulmonary hypertension.² The patient may have only a systolic murmur instead of the typical machinery murmur. Because of the pulmonary hypertension, the flow through the ductus occurs only in systole. Such a lesion may be misdiagnosed as a ventricular septal defect. This type of ductus should undoubtedly be divided instead of ligated to reduce the risk of recanalization. (2) The second type of ductus is the so-called reversed ductus¹² in which the flow is from the pulmonary artery to the aorta. The patient has cyanotic lower extremities with normal-coloured arms and head. In general it is hazardous to close such a ductus because it is acting as a safety valve for the high-tension pulmonary circuit. Closures will generally precipitate catastrophic rapid right heart failure.

The diagnosis of an ordinary patent ductus arteriosus should be easy. The patient will have a typical continuous machinery murmur heard maximally over the second left intercostal space. There will be a moderately wide pulse pressure and some tachycardia. There will be an active precordium and forceful apex beat. With the atypical ductus having only a systolic murmur, diagnosis has to be made by cardiac catheterization and/or angiocardiology.

COARCTATION OF THE AORTA

As in the case of patent ductus arteriosus, it is considered that all coarctations of the aorta should be corrected. The optimum age for this operation is between eight and 12 years of age, because at this period an adequate-sized anastomosis can be made and the vessels are still elastic and easy to work with. They are usually not yet affected by atheroma. However, Keith and Mustard¹³ have shown that some children under one year of age have a type of coarctation, known as the infantile type, which requires operation at this early age because of severe heart failure. Excellent results may be obtained by operation at this early age.

The method of correction is by means of a left thoracotomy incision. The narrowed area is excised and an end-to-end suture anastomosis is

performed. In older persons in whom the vessel is more rigid, and damaged by atheroma, it may be necessary to use a graft to bridge the gap. Gross¹⁴ has shown excellent results from the grafting procedure (Fig. 5). The results of opera-

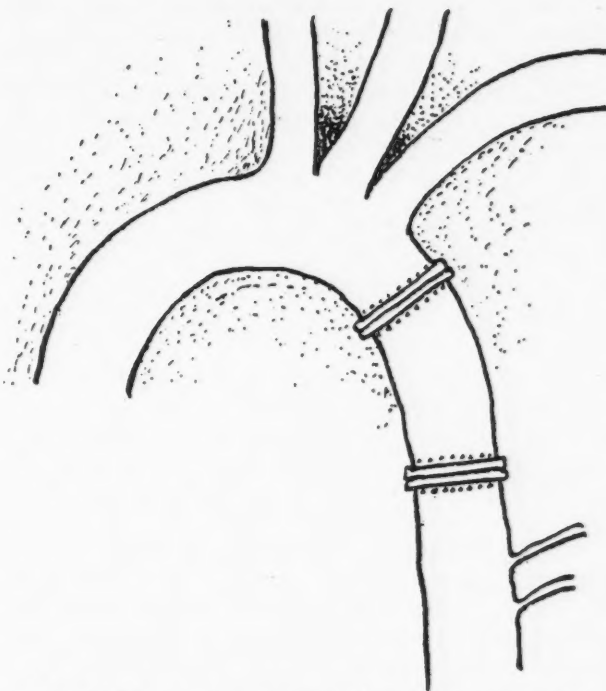


Fig. 5.—Repair of coarctation of aorta by homograft.

tion are usually excellent, and a mortality rate well under 10% should be expected. Gross had a 15% mortality in the first 100 cases he did, but only 2% in the last 100 cases. The hypertension in the upper half of the body will fall to normal levels in many cases, and in all successful cases will be considerably reduced. Reifstein, Levine and Gross¹⁵ reviewed 104 cases of coarctation of the aorta. They showed that the expectation of life in patients with this deformity was about 30 years. Death was due to left heart failure or a cerebrovascular accident (29%), rupture of the aorta (23%), and subacute bacterial endocarditis (22%). Twenty-six per cent lived a normal life span. The expectation of life after correction is as yet unknown, as the first resection was carried out in 1944, so that a further 50 years will have to elapse before this is known, but it is expected that it will well exceed 45 years of age.

The diagnosis of coarctation is generally simple, and well within the scope of the family doctor. The principal features are hypertension in the arms and hypotension in the legs. Palpation will reveal absent or markedly diminished femoral pulses. Palpation in the interscapular area may reveal abnormal arterial pulsations. Radiographs of the thoracic cage will frequently show notching of the under surface of the ribs.

PURE PULMONARY STENOSIS

By this is meant a stenosis of the pulmonary valve, or of the right ventricular outflow tract in the form of an infundibular stenosis, or a combination of the two. The commonest condition is a valvular stenosis. There is an intact interventricular septum which distinguishes the condition from a tetralogy of Fallot. There may be a patent foramen ovale or an interauricular defect, in which case the patient will develop cyanosis on exercise but will be of normal colour at rest.

By no means do all patients suffering from this condition require surgical relief. It is generally considered that a systolic pressure in the right ventricle of 70 mm. Hg or higher (the normal being 25 mm. Hg) merits operation. In general the patient must have symptoms before operation is indicated.

The symptoms include right heart failure, dyspnoea on exertion (which is due to a fixed cardiac output), or cyanosis on exertion. The diagnosis may be suspected when a thrill is felt and a loud, harsh systolic murmur is heard in the second left intercostal space adjacent to the sternum propagated out to the pulmonic area. The murmur appears to be very close to the ear. The final diagnosis depends on cardiac catheterization, from which a pressure gradient may be proved to exist across the pulmonic valve.

The operation may be done by either of two techniques: (1) the closed technique evolved by Brock;¹⁶ (2) the open technique evolved by Swan.¹⁷

In either technique the left chest is opened, the stenosed valve is divided by some form of knife, and the opening so produced is dilated up. In the Brock technique a valvulotome is thrust through to the right ventricle and up through the valve, cutting it as the knife goes through; then a dilator is passed up the same route. Potts has modified the knife and dilator so that the operation is much simpler. With an infundibular stenosis the obstructing muscle tissue has to be punched out. In the open technique, the circulation is temporarily interrupted under hypothermia; the pulmonary artery or right ventricle is deliberately opened and the obstruction divided under direct vision.

The results are usually most gratifying and the mortality rate should be under 10%. Brock and Campbell¹⁸ do not consider it necessary to reduce the right ventricular pressure completely to normal levels to achieve a good result.

PULMONARY ARTERIOVENOUS FISTULA

In general it is thought that in all cases this condition merits operative correction unless the condition is multiple.¹⁸ The defect consists of an abnormal communication between a branch of the pulmonary artery and a pulmonary vein. It is usually congenital and may be associated with congenital telangiectasia.

This diagnosis should be suspected in a patient who develops cyanosis later in life, say in the teens, and in whom no heart lesion is found. Careful auscultation of the chest may disclose a small area over which a typical machinery murmur is heard, comparable to that of a patent ductus arteriosus. Plain radiography of the lung fields will show an abnormal vascular shadow which pulsates on fluoroscopy, with heavy feeding vessels. Angiocardiography will clinch the diagnosis by showing radio-opaque dye shunting through the abnormal arteriovenous communication. Angiocardiography is also useful to show multiple small fistulae apart from the main lesion.

The treatment is usually by lobectomy, though wedge excision or ligation of the feeding vessels has been used. The results are gratifying. The patient loses his cyanosis on the operating table and will be cured provided the condition is not multiple. Caution should be expressed in prognosis, however, because of the known tendency for this condition to be multiple; small fistulae may subsequently open up and become large, to produce a return of the cyanosis.

ANOMALIES OF THE AORTIC ARCH

There are several variations of this condition, but all are due to persistence in part or in whole of the right aortic arch. If both the right and the left aortic arches persist, a vascular ring results which encircles and compresses the midline superior mediastinal structures, viz. the trachea and the oesophagus. Usually the ring encircles both the trachea and the oesophagus, but it may encircle only the trachea or only the oesophagus¹⁹ (Fig. 6).

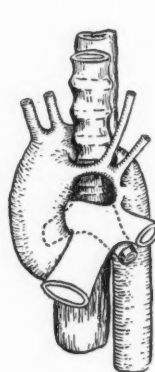
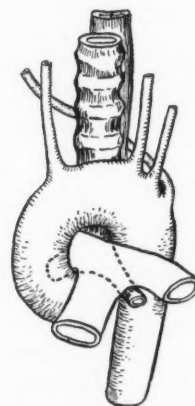
AORTIC
VASCULAR RINGRETRO-OESOPHAGEAL
SUBCLAVIAN ARTERY

Fig. 6

Symptoms will manifest themselves early in life, usually within the first three months. The baby may suffer from dysphagia and regurgitate its feedings. It will usually have stridor and may have dyspnoea, which will become urgent if the infant gets a respiratory infection. Tracheobron-

chitis will then cause swelling of the tracheal mucous membrane, which will produce extreme narrowing at the already constricted area of the trachea. Death from suffocation due to acute respiratory infection is not infrequent.

Diagnosis should be easy. It is suspected from the history. Plain radiography of the chest to show up the air-filled trachea should show the constriction, especially in the lateral view. A barium swallow will show a narrowed oesophagus. Bronchoscopy and oesophagoscopy should not be required. If doubt still exists, an angiogram or a retrograde aortogram will clinch the diagnosis. Effler,²⁰ Riker,²¹ and Gross²² have written excellent reviews of this condition.

The treatment is to perform left thoracotomy and divide the constricting ring at the most suitable site from an anatomical point of view. By this means the trachea and oesophagus are freed from their imprisonment and pressure is relieved. The results are gratifying, but the operation is not without danger during the induction stage of the anaesthetic due to the poor airway. All such cases should have surgical relief, provided the symptoms merit it.

A second vascular abnormality is the retro-oesophageal subclavian artery (Fig. 6). This produces the condition known as dysphagia lusoria. It is due to the persistence of the right aortic arch from which the right subclavian artery arises. The right subclavian artery in this condition arises from the aorta distal to the left subclavian artery and passes backwards, upwards and to the right behind the oesophagus. During infancy the child may have feeding difficulties, with moderate to marked regurgitation. Subsequently these symptoms may regress, to return later in life. The common complaint is a feeling of a "lump in the throat" and the patient has to swallow twice to get food down. Occasionally a lump, such as a piece of apple, may stick in the upper oesophagus.

Diagnosis is readily made by a barium swallow, which will show a characteristic oblique indentation in the upper oesophagus above the aortic arch passing upwards and to the right. Oesophagoscopy will show a pulsating ridge indenting the upper oesophagus from behind. If the beak of the oesophagus is pressed backwards on to the ridge, the radial pulse can be obliterated. At the same time the right carotid artery can be checked to make sure that this is not an aberrant right innominate artery.

Many patients with a retro-oesophageal subclavian artery are symptomless and therefore do not require treatment, but where symptoms are sufficiently severe, operation is indicated. Through a left thoracotomy the aberrant vessel is found at its origin from the aorta and the proximal 1 to 1½ inches (2.5-3.75 cm.) is excised between ligatures, care being taken that the distal end slips through into the right chest. Because of the excellent collateral circulation around the

shoulder joint, the nutrition of the right hand is in no way jeopardized. The results are interesting and gratifying. The patient usually spontaneously remarks that he has never known what normal swallowing was like before, because he has lived with his abnormality all his life. Instead of having to swallow two or three times to get his food down like a fowl, the food seems to shoot straight down.

Mortality from the thoracotomy should be nil.

CONGENITAL OBSTRUCTION OF THE PORTAL VEIN

This condition is generally known as Banti's syndrome (Fig. 7). There is an obliteration of the portal veins in the region of the porta hepatis. The liver is normal and its function is normal. However, because of the obstruction of the portal

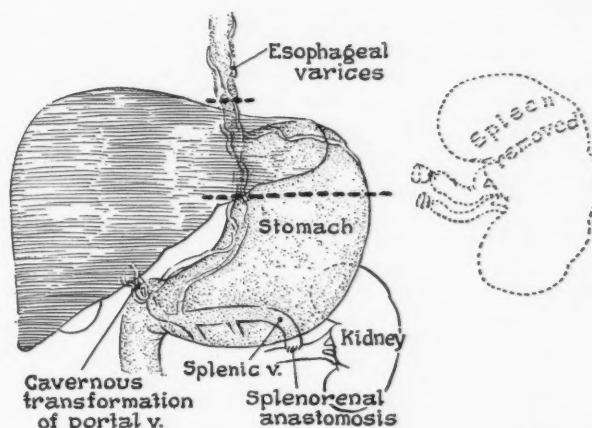


Fig. 7.—Congenital obstruction of portal vein showing methods of treatment.

vein a high tension develops in the portal venous bed. As a result of this, splenomegaly develops. Collateral venous channels are found in the oesophageal submucosa, producing varices. These varices represent the sword of Damocles of this condition. Severe exsanguinating hæmatemeses occur, often before the age of 5 years, and patients rarely survive beyond 20 years of age.

Diagnosis is suspected when a child presents with hæmatemesis, splenomegaly, oesophageal varices and a normal-sized liver. Liver tests show normal function. A splenogram will show a large splenic vein with cavernous or varicose transformation of the portal vein. As this is a mechanical obstruction, the only logical treatment is to decompress the portal venous system into the vena caval system. This is accomplished by excision of the spleen and end-to-side junction of the splenic vein into the side of the renal vein by suture anastomosis. Blakemore,²³ Linton²⁴ and Walker²⁵ show excellent results from this operation, with 85% relief from subsequent bleeding. A good anastomosis will remain patent, and the varices in the oesophagus will regress. It should be considered a surgical crime to remove the spleen in this condition without doing a spleno-

renal anastomosis, because the one chance of survival of these children has thus been removed.

MITRAL STENOSIS

In acquired heart disease, mitral stenosis stands pre-eminent as the condition in which surgery can give real relief. From a purely practical point of view it is wise to look on this as a mechanical obstruction—a dam thrown across the onward passage of the blood through the heart, whereby the cardiac output becomes relatively fixed at a low level. As a result of this conception most of the symptoms and signs of mitral stenosis can be deduced. This is probably an oversimplification of the condition upon which a vast literature has now accumulated. However, for the purpose of this discussion it will suffice.

Symptoms:

1. Dyspnoea on exertion, resulting from the fixed cardiac output, and usually the most prominent symptom.
2. Recurring attacks of hæmoptysis due to the pulmonary congestion.
3. Attacks of pulmonary œdema, especially during pregnancy.
4. Right heart failure with peripheral œdema.
5. Systemic emboli.
6. Recurrent attacks of bronchitis and pneumonitis.

Signs:

1. Diastolic or presystolic murmur, heard best at the apex.
2. Mitral opening snap.
3. Pulmonary second sound accentuated and often split.
4. Radiographic signs often of pulmonary congestion with an enlarged pulmonary artery. There is usually an enlarged left auricle; there should be no enlargement of the left ventricle.
5. Electrocardiographic evidence of right heart strain.

Auricular fibrillation may or may not be present, and in no way contraindicates operation. The most difficult decision to make is whether significant regurgitation exists. A pansystolic murmur, a large left ventricle, and evidence of left heart strain are all indications of regurgitation and a contraindication to successful surgery. Pregnancy is no longer considered a contraindication; indeed the reverse is true, if the pregnant woman is getting into difficulty from pulmonary congestion.

The age limits for operation (Wood²⁶) are, broadly stated, from the teens up to 55 years of age. Operation is to be avoided before 20 if possible, because there is a risk that the rheumatic process may still be active, or may flare up after operation. After 55 years of age again, surgery is usually not indicated, because if the patient has reached that age it is probable that the stenosis has not been over-severe and life will not be greatly prolonged by operation. However, it is important to realize that there is no absolute age limit; each case must be assessed on its merits.

The operation is performed through a left thoracotomy. The mitral valve is approached through the left auricular appendage and in about 75% of cases the valve can be split with the finger. In the remaining cases some form of valvulotomy knife has to be used.

The results are remarkably gratifying and the mortality rate should be less than 10%. In well-selected cases excellent results can be expected in 75%; 15% will improve and 10% will be failures.²⁷ The single greatest danger is systemic embolism produced either from clots in the left auricle or from calcium plaques knocked off the valve. Values up to 10% have been given for this accident by Glover and O'Neill.²⁸ The most serious result of embolism is hemiplegia. In spite of various manœuvres carried out to reduce its incidence, it will probably always be a hazard.

The results in the successful cases are most gratifying. Usually the patient can return to a normal life; in the case of a housewife—and they make up the majority of patients—this means ability to do her own housework, a dubious privilege perhaps.

CONSTRUCTIVE PERICARDITIS

This is an example of a supremely curable type of acquired heart disease. Pathologically the heart is imprisoned in a thickened constricting fibrous bag, the pericardium, which may have plaques of calcium in its walls. This prevents the heart chambers, in particular the ventricles, from relaxing and filling adequately in diastole. As in mitral stenosis, there is a low, fixed cardiac output. Frequently the myocardium is in good condition.

The diagnosis should be relatively easy. The patient has all the signs of severe congestive heart failure, such as peripheral œdema, engorged neck veins, enlarged liver, and ascites, yet without any evidence of pulmonary congestion. The patient therefore can sleep flat with only one pillow, and the obstruction occurs before the blood reaches the lungs.

Fluoroscopy will show a small quiet heart—using the word quiet to mean a heart with reduced or absent pulsation. The apex beat is often impalpable. There should be no cardiac murmurs. The venous pressure is grossly raised, e.g. 200 mm. of saline. There may be a paradoxical pulse. The blood pressure will be low, with a low pulse pressure. The electrocardiogram shows low potentials. Medical treatment can do nothing to relieve the condition, which is mechanical in origin. The treatment is therefore surgical. It consists of pericardiectomy, best done through a cross-bow incision (Johnson and Kirby;²⁹ Fig. 8). The constricting pericardium must be removed from both ventricles and the heart freed from the diaphragm, thereby permitting free filling and dilatation of the ventricles, so that Starling's law of the heart may once more apply.

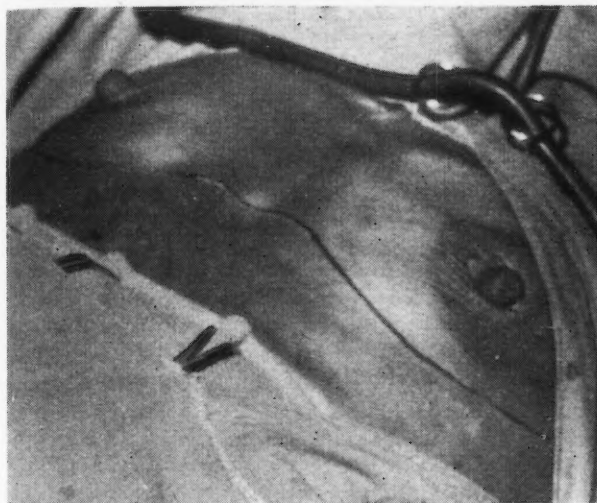


Fig. 8.—Cross-bow incision for constrictive pericarditis.

The results are in general most gratifying, with restoration of the patient to normal activity. It is generally believed that at least 75% of the cases are due to tuberculosis (Blalock and Burwell³⁰), and therefore a cover of streptomycin and para-aminosalicylic acid is indicated before operation.

WOUNDS OF THE HEART

These may be divided into the catastrophic and non-catastrophic varieties. The catastrophic wounds are usually of such severity that the patient dies in a matter of minutes because of massive hæmorrhage. Gunshot wounds are of such a type. However, stab wounds, due to knives or ice picks, are more likely to be non-catastrophic and the patient's condition may deteriorate over the course of $\frac{1}{2}$ to 1 hour. The latter patients suffer from cardiac tamponade, which may be likened to acute constrictive pericarditis from the point of view of symptoms. It produces rapidly diminishing cardiac output due to diminished diastolic filling of the ventricles, so that there is dilatation of the veins of the neck and upper extremities with raised venous pressure, distant heart sounds, falling blood pressure and loss of consciousness. The immediate treatment is pericardial aspiration, preferably by the xiphisternal route.³¹ The removal of 30-50 c.c. of blood usually suffices to resurrect the patient from a moribund state to one of consciousness. Meanwhile a blood transfusion should be set up and the operating room should be alerted. Frequently one or more aspirations of the pericardium may be all that is required.³¹ However, if this fails to maintain the condition of the patient, an open pericardiotomy is indicated, with suture of the wound of the heart.

SYSTEMIC ARTERIOVENOUS ANEURYSM

These are usually due to trauma. They are of serious significance if one of the major vessels is involved, either of the limbs, or the head and

neck. The diagnosis is usually easy. There is a history of trauma and evidence of the wound. The part shows dilatation of the superficial veins and feels hotter than the opposite side. A continuous machinery murmur is heard over the area of the aneurysm and a thrill may be felt as well. If the shunt is involving the major vessels, there will be a high pulse pressure and a tachycardia. If the shunt is obliterated by pressure, Branham's sign will be positive, viz. a fall in pulse rate and a diminution of pulse pressure. In the course of time, if the shunt is large, heart failure due to high cardiac output may develop.

The treatment is to explore the fistula, having gained control of the major feeding vessels proximally. Several procedures are then possible: (1) A quadruple ligation in continuity may be carried out. (2) The vein may be ligated and the defect in the artery repaired through the vein. (3) The aneurysm or fistula may be excised, in which case continuity of the artery may be restored by a suitable preserved arterial grant. The results of the latter two procedures are good, with restoration of the patient's circulatory state to normal without loss of blood flow to the extremity.

AORTIC ANEURYSM

Up to four years ago the treatment of aortic aneurysm was unsatisfactory and palliative. Since then the treatment of choice has been excision of the aneurysm. Saccular aneurysms may be excised and the neck of the sac repaired by suture. Fusiform aneurysms involve excision of the diseased portion of the aorta and restoration of continuity by grafts, which are either preserved homografts or plastic substitutes. Blakemore,³³ Cooley and DeBakey,³⁴ Bahnson³⁵ and Dubost³⁶ have been pioneers in this field. All areas of the aorta have been treated successfully by one of these methods.

The prognosis of aneurysm of the aorta once it has begun to produce symptoms is poor, and all such cases merit radical excision. Kampmeier³⁷ in 1938 reviewed 633 patients with saccular aneurysm of the aorta and pointed out that only 3% survived two years. Estes³⁸ has shown that arteriosclerotic fusiform aneurysm of the abdominal aorta is also a serious disease; 81% of his patients were dead within five years. In the light of these figures the operative mortality of 18% quoted by DeBakey and Cooley³⁹ in 101 cases is not prohibitive; this is especially so in view of the fact that among these 101 patients, 17 had ruptured aneurysms, of which 59% were salvaged.

The diagnosis of a thoracic aortic aneurysm by the family doctor may be difficult; fluoroscopy and chest radiographs will render it suspect, but definitive diagnosis usually demands angiocardiography or aortography. On the other hand, abdominal aneurysm can usually be readily diag-

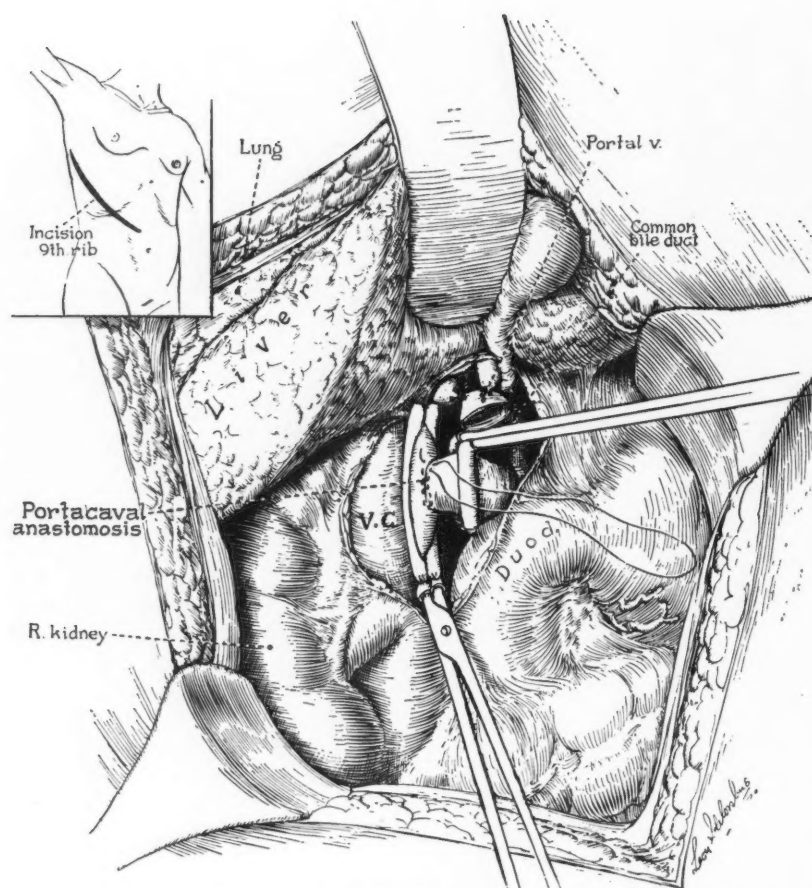


Fig. 9.—Porto-caval anastomosis for portal hypertension secondary to cirrhosis of liver.

nosed by palpation of a pulsating mass in the midline of the abdomen.

OBLITERATIVE DISEASE OF THE LOWER AORTA AND ILIAC VESSELS

This condition should be suspected when a patient presents with a history of intermittent claudication of the gluteal muscles or the thigh muscles. Not infrequently such patients find their way to the neurologists. Diagnosis may readily be made by the finding of absent femoral pulses at the groin. The extent of the disease is determined by aortography.

Favourable cases are those in which the occlusive disease is found localized to the lower aorta and iliac vessels, but with patent vessels distal to the block. Such cases may be treated by excision of the occluded vessels and restitution of continuity by either a preserved homograft of aortic bifurcation or a plastic substitute.

PORTAL HYPERTENSION WITHOUT LIVER FAILURE

This condition is usually due to cirrhosis of the liver of the Lænnec type. The patient presents with a massive hæmatemesis from oesophageal varices. On examination a grossly enlarged liver, a normal-sized but hard liver,

or a grossly shrunken, impalpable liver may be found. There is usually a palpable, hard spleen. Barium swallow will reveal oesophageal varices. From these findings it may be deduced that the patient has a hypertension in his portal venous system. If ascites is absent and liver function tests are satisfactory, definitive surgery should be considered. The most useful liver function tests are estimation of the serum proteins and in particular the albumin-globulin ratio, estimation of serum bilirubin levels, and the cephalin flocculation test. The bromsulphophthalein excretion test is also a very sensitive test of liver function.

The seriousness of this condition is shown by Linton's⁴⁰ figures; out of 128 patients reviewed at the Massachusetts General Hospital 1934-45, 30% died at the end of one year, 78% were dead at the end of four years and 47% died of exsanguination. Lord⁴¹ stated that 25% died after their first hæmorrhage and 70% were dead in two years.

The best treatment available is a porta-caval anastomosis using a right thoraco-abdominal incision. The end of the portal vein is sutured to the side of the inferior vena cava, thereby decompressing the high pressure venous system into the low pressure caval system (Fig. 9).

The results are gratifying in well-selected cases. Blakemore quotes an 85% survival rate of two years or longer with freedom from major hæmorrhage.

GROUP 2. DISORDERS IN THE TREATMENT OF WHICH SURGERY MAY BE EXPECTED TO GIVE DEFINITE IMPROVEMENT

Congenital lesions

1. Tetralogy of Fallot.
2. Auricular septal defects.
3. Tricuspid stenosis.

Acquired lesions

1. Aortic valvular stenosis.
2. Aortic regurgitation.

This is a hard group to correlate, because the surgical techniques are being developed so rapidly that it is difficult to assess the present status objectively. Furthermore, some lesions in this group may be much more satisfactorily treated than others. For instance, some authorities may well question the inclusion of the aortic lesions in this group. Some would also feel that

tetralogy of Fallot should be included in group 1 rather than in group 2. However, it is because the surgical techniques for these lesions are in a state of evolution that it seemed wise to place them in group 2. Without doubt, in a very few years tetralogy of Fallot and auricular septal defects will take their rightful place in group 1, and no doubt ventricular septal defects will be up there beside them. When a satisfactory and safe method is finally accepted to by-pass the heart so that open cardiomy and suture under direct vision is possible with a low mortality, these conditions will be curable by surgery with excellent results.

TETRALOGY OF FALLOT

This is the commonest cause of cyanotic congenital heart disease with which the child may reach the age of two years or more. Cyanosis develops a variable time after birth, and the symptoms and signs associated with any such cyanosis arise, viz. limited exercise tolerance, spells of aggravated cyanosis and unconsciousness, clubbing of fingers and toes, and a tendency to squatting. There is a marked polycythæmia. Hæmoglobin levels may vary from 120%-170%; red cell counts may vary from 6-10 million. The heart is not enlarged; the rhythm is regular; there is a systolic murmur, heard most clearly over the third left intercostal space. The essential physiological defect is diminished blood flow through the lungs, so that radiographs show abnormally clear lungs. The heart is classically bootshaped. The electrocardiogram should show a right ventricular hypertrophy.

The object of surgical treatment is to increase the volume of blood flowing through the lungs. This may be accomplished either indirectly or directly.

The indirect methods consist of a shunt, either the Blalock-Taussig⁴² shunt between the subclavian artery and the pulmonary artery, or the Potts⁴³ anastomosis between the descending aorta and the pulmonary artery. The direct method is that advocated by Brock⁴⁴ which consists in punching out the stenosis in the right ventricle or dividing the stenotic pulmonary valve.

Either of these methods may be expected to give 75% of excellent results. The cyanosis will disappear, as will the polycythæmia, and the exercise tolerance will improve markedly. Therefore, all children suffering from tetralogy of Fallot should be treated surgically. If possible, operation should be deferred till the age of 3-5 years, at which time an anastomosis of more satisfactory size may be produced. However, if the disability is severe, and spells and cyanosis are marked, operation should be carried out forthwith.

Within the last 18 months Lillehei *et al.*⁴⁵ have brilliantly achieved the ultimate goal in the

treatment of this condition by by-passing the heart via a cross circulation or a pump oxygenator, so that under direct vision they can open the heart and correct the abnormality completely. However, at the present time, the technique is not of universal application and therefore the shunt procedures are still the general treatment of choice.

AURICULAR SEPTAL DEFECTS

In this condition there is an increased flow of blood through the pulmonary circulation. Cyanosis is therefore unusual. The heart enlarges and the danger is of high output heart failure. The diagnosis requires cardiac catheterization.

By no means do all auricular septal defects merit closure. However, those causing symptoms can now be closed by a variety of techniques, either closed or open. The mortality rate is reasonable and the results are gratifying.

TRICUSPID ATRESIA

This is a severe deformity and produces severe symptoms essentially similar to those of tetralogy of Fallot. Cyanosis is present at birth. The electrocardiogram shows a left ventricular preponderance, and cardiac catheterization or angiocardiology may be used to clinch the diagnosis.

Surgical treatment is mandatory and consists of a systemic-pulmonary artery shunt to increase pulmonary blood flow, to which it may be necessary to add the creation of an interauricular defect according to the method of Blalock and Hanlon,⁴⁶ to facilitate the passage of the blood from the right to the left side of the heart.

The results of this procedure are not as good as for tetralogy of Fallot, but are sufficiently good to merit its use.

AORTIC STENOSIS

This may be due to rheumatic infection or to arteriosclerotic disease. Some authors feel that practically all aortic stenosis is due to rheumatic fever, and the arteriosclerotic changes occur in the already diseased valve. This condition can usually be diagnosed quite readily. There is a loud systolic murmur heard maximally over the second right intercostal space, with an absent aortic second sound. There is a large left ventricle. The electrocardiogram shows left ventricular hypertrophy. The pulse pressure is low. The symptoms of serious import are attacks of syncope, angina, and left heart failure. By the time these symptoms have developed, life expectancy is rarely longer than two years. Several surgical techniques have been devised to deal with this lesion, aimed at forcibly opening up the narrowed valve. The mortality rate of these procedures is still high (around 25%). However,

compared with the poor ultimate prognosis of the condition this mortality is reasonable, and surgery should be considered when the above symptoms supervene. The causes of death at operation are ventricular fibrillation, uncontrolled hæmorrhage from the left ventricle, and aortic regurgitation inadvertently produced by the procedure.

AORTIC REGURGITATION

What has been said about aortic stenosis largely applies to aortic regurgitation, as regards the etiology and prognosis. The symptoms are essentially similar, viz. syncope, angina and left heart failure, and carry the same sinister prognosis. The diagnosis is usually easy. A systolic diastolic murmur is heard over the third left intercostal space. There is a large left ventricle and the electrocardiogram shows left ventricular hypertrophy and strain. The pulse pressure is high.

The only surgical treatment available at present is that evolved by Hufnagel.⁴⁷ A plastic ball valve is inserted into the descending aorta just distal to the transverse arch and fixed there by a multi-point fixation technique with plastic rings (Fig. 10). This valve will reduce the regurgitation by 70%. The mortality rate of the operation is 25%. In view of the serious prognosis of the lesion, once symptoms have developed, surgery is a reasonable approach. The drawback to the method is the noise of the valve, which gives a loud click with every heart beat. The patient becomes adjusted to the noise, but to his relatives it may not be so acceptable.

It may thus be seen that the surgery of the aortic valve still leaves much to be desired; however, medical treatment is unsatisfactory and therefore surgery must be considered in these lesions.

GROUP 3. CONDITIONS IN WHICH SURGERY HAS NOT JUSTIFIED ITSELF AS THE TREATMENT OF CHOICE AT PRESENT

This is the group in which much experimental endeavour has been expended to find suitable surgical techniques to deal with the lesions, but as yet none have received wide acceptance to recommend them for general use.

There are a number of congenital lesions in this group in which the ultimate goal still seems a long way off. These include abnormal origin of the coronary arteries; transposition of the great vessels; single ventricle; Eisenmenger complex; pulmonary hypertension and the Lutenbacher syndrome. The problem of ventricular septal defect, however, seems nearer to solution as a result of the work of Lillehei and his colleagues. In the field of acquired lesions, coronary artery disease and mitral insufficiency present a challenge. Beck,⁴⁸ Vineberg⁴⁹ and

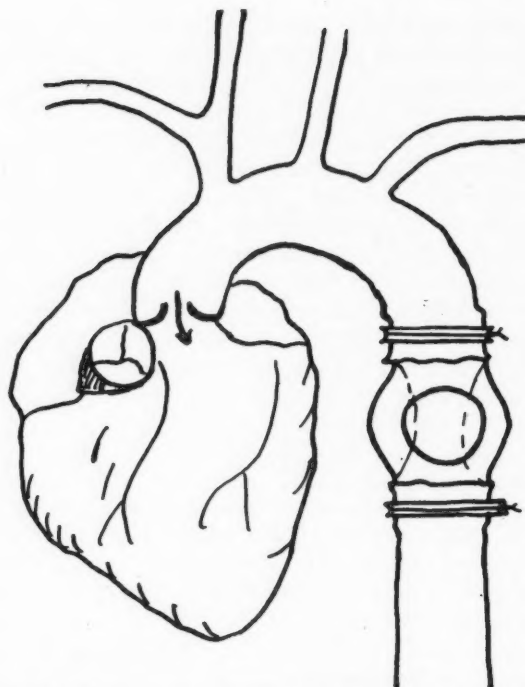


Fig. 10.—Treatment of aortic regurgitation by means of Hufnagel valve.

Thompson⁵⁰ have attacked the problem of increasing the blood supply to the ischaemic myocardium both experimentally and clinically. Beck performs two operations; one involves arterialization of the coronary sinus, and the other encourages the development of vascular adhesions between the pericardium and the myocardium. Thompson has practised this latter type of procedure for the past 15 years. Vineberg attempts to vascularize the myocardium by means of an internal mammary arterial implant. Though success has attended some of these procedures, the results would appear to be such that they cannot generally be advocated for coronary ischaemia.

Mitral insufficiency is still a problem which has defied solution. The prospect is better now, in that open operation on the heart, under extracorporeal circulation, appears to be close at hand. However, even under these circumstances the repair of or replacement of a grossly diseased and deficient mitral valve still has to be surmounted, and no satisfactory prosthesis has as yet been devised. It is evident that stenotic valves represent a simpler problem than incompetent valves.

CONCLUSION

Over the past 20 years tremendous progress has been made in the surgery of the heart and great vessels. Many lesions have now a recognized and acceptable surgical treatment for their cure or amelioration. Many lesions still remain in which surgery is not the best treatment. The rapid approach of the era of extra-corporeal circulation with cardiac by-pass and open cardiectomy will solve many of these problems.

The purpose of this review has been to present to the family doctor the present conservative views on the scope of cardiovascular surgery, so that he may know those patients to whom he should offer the help of surgery. On the other hand, he will know those patients whom he should have assessed with a view to possible surgery, without being too encouraging, and those to whom, at the present time, he should indicate that surgery has little to offer.

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MEDICAL MEETINGS

COMBINED SECTION PROGRAM, QUEBEC AND ONTARIO INDUSTRIAL PHYSICIANS CONVENTION

The annual combined meeting of the Industrial Section of the Ontario Medical Association and the Industrial Medical Association of the Province of Quebec will be held in the Royal Connaught Hotel, Hamilton, Ont., on September 26, 27 and 28, 1956. All physicians with full-time or part-time industrial affiliations are welcome to attend the sessions. Registration will be at the Royal Connaught Hotel from 9.00 to 11.00 a.m. on September 26. The program is as follows.

September 26

- 9.00-11.00 a.m.—Registration.
11.00 a.m.—Annual Meeting of members of Ontario Section.
12.30 p.m.—Official Luncheon, members of both Sections.
2.30 p.m.—Afternoon Session (Dr. J. Kenneth Bell, Chairman): "Common pitfalls in diagnosis"—Dr. Ray F. Farquharson, Professor of Medicine, University of Toronto; "The degenerative cardiovascular diseases in industry"—Dr. D. P. Murnaghan, Department of Medicine, University of Toronto; "The use of antibiotics"—Dr. K. J. R. Wightman, Associate Professor of Medicine and Therapeutics, University of Toronto.
7.30 p.m.—Annual Dinner (dress informal). Speaker: Dr. William Deadman, Regional Pathologist, Department of the Attorney General of Ontario.

September 27

- 9.00 a.m.—Morning Session (Dr. Ernest C. James, Chairman). Symposium on Traumatic Surgery: "Traumatic surgery of the hand"—Dr. John W. McNichol, Chief Plastic Surgeon, and Dr. O. J. Mirehouse, Plastic Surgeon, Hamilton General and St. Joseph's Hospitals; "Ambulatory treatment of bursitis"—Dr. Robert N. Loft-house, Orthopaedic Surgery Staff, Hamilton General Hospital; "The differential diagnosis of acute head injuries"—Dr. Ronald A. Dolan, Neurosurgeon—Surgical Staff, Hamilton General and St. Joseph's Hospitals; "The common fractures in industry"—Dr. R. E. Nicholson, General Surgeon—Orthopaedic Staff, Hamilton General Hospital, and Plant Surgeon, Steel Company of Canada.
1.00 p.m.—Luncheon (Hamilton General Hospital dining room). Speaker: Professor Aldwyn B. Stokes, Department of Psychiatry, University of Toronto.

- 2.30 p.m.—Afternoon Session (Dr. Donald K. Grant, Chairman): (1) Panel, "The Role of the Industrial Physician as a Hygienist". Moderator: Dr. Russell G. Birrell, Medical Director, Imperial Oil Ltd. Members: Dr. R. D. Appleford, Hamilton; Dr. F. M. R. Bulmer, Division of Industrial Hygiene, Ontario Department of Health, Toronto; and Dr. Rodger A. Whitman, Hamilton. (2) Panel, "Mental Health in Industry". Moderator: Aldwyn B. Stokes, C.B.E., M.R.C.P., Professor of Psychiatry, University of Toronto. Members: Dr. Richard G. Warminton, Niagara Falls; Dr. Walter Bremner, psychiatrist, Toronto; Mr. W. Caron Jones, industrial psychologist, Toronto; and Mr. Farrel Toombs, sociologist, Toronto.

- 7.30 p.m.—Buffet supper and dance (dress informal). The Brant Inn, Burlington.

September 28

- 9.00 a.m.—Morning Session—Nora-Frances Henderson Hospital. (Chairman: Dr. Charles Shortt, Chairman of the Industrial Medical Association of Quebec.) "Radiation hazards in industry"—Henry G. Thode, Ph.D., Principal of Hamilton College; "The use of radioactive isotopes in medicine"—Dr. Charles H. Jaimet, Medical Director, Department of Medical Research, McMaster University, Hamilton; "Management of injuries of the

ankle" (in French)—Dr. Jacques Robichon, Professor of Orthopaedic Surgery, University of Ottawa; "Report on the small plant industrial health services project at Kitchener, Ont."—Dr. R. B. Sutherland, Division of Industrial Hygiene, Ontario Department of Health, Toronto; "Management looks at industrial medicine"—Mr. T. A. Rice, Vice-president, International Harvester Company Ltd., Hamilton.

1.00 p.m.—*Luncheon* (Hospital dining room). Speaker: Mr. Harvey F. McCulloch, Q.C., Crown Attorney, Hamilton.

Afternoon: Boat tour of the Bay of Hamilton (with ladies) to view industry from the water.

The *Ladies' Program* will include visits to Canadian Westinghouse, McMaster University, the Tamahaac Club, and the Botanical Gardens.

CONGRES DES MEDECINS CANADIENS DE LANGUE FRANCAISE DANS L'OUEST

Les 13-14-15 et 16 septembre prochain, l'Association des Médecins de Langue Française du Canada tiendra son congrès annuel à Jasper, Alberta. C'est la première fois que cette grande réunion annuelle a lieu dans l'Ouest canadien.

A cette occasion, les organisateurs ont voulu préparer un voyage, qui en plus de servir à des fins strictement scientifiques, prendra en même temps le caractère d'un événement culturel. Et les médecins de langue française de l'Ouest seront les hôtes de l'Association.

Le congrès médical proprement dit se déroulera à Jasper pendant quatre jours, et à Vancouver pendant une soirée. Aux deux endroits, on a mis sur pied un programme élaboré; et l'on y attend une assistance nombreuse et enthousiaste.

Le voyage se fera par train spécial quittant Montréal le 10 septembre et y revenant le 23 du même mois. A l'aller, un arrêt de 24 heures est prévu pour Winnipeg et St-Boniface où des rencontres sont organisées entre les groupes manitobains et les voyageurs de l'Est. Puis une nouvelle halte sera faite à Edmonton, où l'Université de l'Alberta recevra officiellement les visiteurs.

Une fois les séances de Jasper terminées, la délégation traversera les Rocheuses pour se rendre à Vancouver où elle séjournera trois jours. Elle en profitera pour établir des contacts intéressants avec le corps médical de la Colombie et la population de langue française de cette extrémité occidentale du Canada.

Au retour, les voyageurs visiteront le Lac Louise et Banff avant de revenir vers l'Est.

La direction locale de ce congrès est confiée aux docteurs L.-P. Mousseau, J.-P. Moreau et Richard-A. Poirier, d'Edmonton, respectivement président, secrétaire et trésorier de ce 26e congrès, auxquels se sont joints les Drs H.-E. St-Louis, de Vancouver, et Henri Guyot, de St-Boniface.

Plusieurs personnalités marquantes, tant du monde civil que religieux, prendront part à la cérémonie inaugurale de Jasper. Citons, entre autres, l'Honorable Paul Martin, ministre de la santé nationale et du bien-être social, son Excellence l'ambassadeur de France au Canada, M. François Lacoste, son Excellence Mgr Jordan, évêque-coadjuteur d'Edmonton, M. André Déchène, président de l'association canadienne-française de l'Alberta, M. Jacques Bousser, médecin des hôpitaux de Paris et délégué spécial de la France à ce congrès, etc.

L'Association des Médecins de Langue Française du Canada a voulu tenir ce congrès dans l'Ouest canadien pour mieux manifester sa solidarité scientifique et ethnique avec ses médecins-membres des provinces occidentales. Elle est heureuse d'aller leur témoigner, à l'occasion de ces assises médicales, son active sympathie

et son profond attachement. Elle croit que ce contact avec nos amis de là-bas, sera profitable à tous, et que visiteurs comme visités, tireront le plus grand bénéfice de cette rencontre confraternelle.

AMERICAN PSYCHIATRIC ASSOCIATION

Montreal is to be host city for the second Divisional Meeting of the American Psychiatric Association on November 8, 9, 10, and 11. The first A.P.A. Divisional Meeting held in San Francisco last year was an outstanding success. The idea of geographic divisional meetings is being promoted as facilitating personal and professional contacts to a degree not possible at the now very large annual meetings of the A.P.A.

The Montreal meeting will be co-sponsored by the Quebec District Branch of the A.P.A. together with branches and societies in New York, New Jersey, and the six New England states. The Canadian Psychoanalytic Society and the north-eastern branches of the American Psychoanalytic Society will participate in the program. Also co-operating in the project are the Canadian Psychiatric Association and the Province of Quebec Psychiatric Association. All sessions will be held in the Sheraton-Mount Royal Hotel.

The planning committee headed by Dr. A. M. Mann of the Montreal General Hospital, and the Program Committee under Dr. V. A. Kral of the Allan Memorial Institute, report that plans are well advanced for both the professional sessions and social activities. The program will include an academic lecture, a number of 20-30-minute papers, and an evening meeting for the general public. Among the papers to be presented: Dr. Frank Beach, of Yale University, will speak on comparative studies in sex drive; Dr. Arnold Gesell will address the evening meeting open to the general public; Dr. Robert G. Heath, Chairman of the Department of Psychiatry and Neurology, Tulane University, New Orleans, will speak on his recent work on schizophrenia; Dr. Clarence B. Farrar, editor of the *American Psychiatric Association Journal*, will speak on Dr. Emil Kraepelin; and Dr. Francis Braceland, President of the A.P.A., will give the Kraepelinian Address.

Enthusiasm for this meeting is exceptional and a turnout of over 1,000 is anticipated. As many members are expected to bring their families, a Ladies Committee under the chairmanship of Mrs. A. E. Moll is organizing special daytime activities.

AMERICAN COLLEGE OF SURGEONS

The American College of Surgeons plans to hold one of its six Sectional Meetings in 1957 in Toronto. For this a three-day program is planned to be held at the Royal York Hotel on March 25-27. This will include general surgery sessions, a schedule of clinics in Toronto teaching hospitals, and an ophthalmology program. Dr. Stuart Gordon, Assistant Professor of Surgery, University of Toronto, and his committee are arranging the program, which will include items on bursitis, amputations, vascular insufficiency, benign breast lesions, and whiplash injuries of the neck.

PUBLIC HEALTH

OTTAWA NEWSLETTER

Many lament the unfortunate gradual divorce of preventive from curative medicine. As a small contribution towards the closing of this gap, we hope to print from time to time a Newsletter giving items of information to practitioners from the Department of National Health and Welfare. We are indebted to them for their courtesy in arranging to forward material to this Journal. The first of these Ottawa Newsletters appears below.

REVISION OF THE CORTICOTROPHIN (ACTH) REGULATIONS

Until recently corticotrophin (adrenocorticotrophic hormone or ACTH) preparations sold in Canada were assayed biologically against the First International Reference Standard by a procedure involving the intravenous injection of the hormone into the test animals. During the last few years experimental evidence was obtained which clearly indicated that the biological activity of some corticotrophin preparations, including the Reference Standard then in use, was dependent on the route of administration. The potency declared on the label frequently differed from the activity found clinically when the hormone was administered other than by intravenous injection. Since many of the products containing corticotrophin were intended for intramuscular or subcutaneous use, a great deal of confusion existed regarding the true potency of these preparations.

Late in 1955, the Second International Reference Standard for Corticotrophin was adopted. This Standard was prepared by a new procedure, and unlike the former one, gave essentially the same activity when injected intravenously, subcutaneously or intramuscularly into the test animals. It could therefore be used to determine the potency of a corticotrophin preparation by assay methods involving either intravenous or subcutaneous administration.

With the Second International Reference Standard available, the Regulations under the Food and Drugs Act for corticotrophin have been revised to ensure that products containing this hormone which are sold in Canada, are labelled in such a way that the declared potency will be dependent on the route of administration. Thus a preparation containing corticotrophin which is labelled for intravenous use must be assayed by a method involving intravenous administration. Likewise, a preparation which is labelled for subcutaneous or intramuscular use must be assayed by a procedure involving subcutaneous injection. However, where the potency of a preparation has been found to be the same by both methods of bioassay, it may be labelled for intravenous, subcutaneous or intramuscular use.

To make certain that patients are given the prescribed dose in international units (I.U.), it is very important for those administering corticotrophin to read carefully the instructions printed on both the label and the package insert provided by the manufacturer.

DRUGS RECENTLY ADDED TO SCHEDULE F OF THE FOOD AND DRUGS ACT

By Order in Council dated July 12, 1956 (P.C. 1956-1053), the following drugs were included in Schedule F of the Food and Drugs Act, thus requiring a prescrip-

tion for their sale: (1) Promazine and its salts; (2) Cycloserine; (3) L-Triiodothyronine.

It is also to be noted that the generic name "busulphan" has now been assigned to the antimetabolite 1, 4-dimethane-sulphonoxy butane.

The above amendments to the Act are detailed in Canada Gazette No. 14, Part 2, July 25, 1956.

MISCELLANY

THE FIRST CASE OF PERNICIOUS ANÆMIA SUCCESSFULLY TREATED IN CANADA

March 1926: A diagnosis of pernicious anæmia was still a death sentence. Transfusions could prolong life only for a matter of months. Many people had fallen victim to this inevitably fatal disease. Its cause and successful treatment were unknown. In Boston, Massachusetts, a young, little-known doctor was quietly working on a cure, but as yet, with scientific honesty, had not published his results. The outlook was still hopeless.

I was three years out of McGill, the only doctor practising in the small seaside community of St. Andrews, New Brunswick. A patient came to me one day, a young man in the prime of life, with symptoms suggestive of the neurological complications of pernicious anæmia, but I was not bold enough to make a diagnosis. The patient went to a large medical centre in the Province, where pernicious anæmia was diagnosed. He returned home to my care and, on my advice, went to a consultant in Montreal, who confirmed the diagnosis. He was sent home with the usual instructions about adequate diet, rest and iron, but the outlook was very bad. He had contracted a severe middle-ear infection with a very high temperature and semi-delirium. The situation appeared desperate; I could offer his distracted parents no hope; they were resigned to his inevitable death.

Then happened one of those rare and dramatic episodes which are indelibly imprinted on the minds of all those taking part. The patient's sister, who was living in Boston, had a friend who by chance knew of the young Boston doctor and his new treatment for pernicious anæmia. Had he found the answer to the problem? The sister wrote her parents in St. Andrews urging that they ask this doctor to come to see their son. The parents of course brought this information to me. I had never heard of Dr. William P. Murphy; my patient had just been to one of the leading consultants in Montreal and no new treatment had been advised. Like all doctors, I was naturally wary of the advice of relatives and sceptical of new "cures" and so advised that any such consultation would be a great waste of money and of no benefit. Then a telegram came from Dr. Murphy saying that he would be glad to come down to see my patient. What kind of doctor is this who suggests a consultation! I was more sceptical than ever. But the family persisted, being ready to clutch at any straw in the hope of saving their son. A telegram was sent asking Dr. Murphy to come.

He arrived by the noon train on a cold winter's day. I was at once impressed by his quiet, unassuming sincerity. Here was a rising physician (whose name, associated with that of the eminent Dr. Minot, was to become almost a household word) coming willingly to the aid of his young, inexperienced country colleague. I asked him about his experiments and he told me that in his reading he had come across some work done on the use of liver in pernicious anæmia. There seemed to be

something to it, but the results were not certain and the idea had not been followed up. He said, "I was impressed by this article and believed that if enough liver were given the results might be astonishing, so I went ahead and I'm sure now that I have a cure." He was quite impressed by the fact that I was "going it alone" in a varied general practice including several confinements and a fractured femur that I was treating successfully at home. I also had a possible appendix case that I told him might involve an operation and he would have to help me. I'll never forget the amazed look on his face. "Do you mean to say you would operate alone in the home!", he said. I told him I would if I had to but I was very glad to have him with me. Roads to the nearest hospital weren't ploughed in those days; in fact, there weren't any ploughed roads in New Brunswick.

We went to see our patient and in a short time Dr. Murphy confirmed the diagnosis and outlined the treatment he was using. We engaged an excellent though stern nurse who half-cooked a pound of liver a day which she persuaded the patient to swallow. If his stomach rebelled and the liver came back, more was offered after a short period, and in spite of everything the pound of semi-raw liver was consumed. The results were nothing short of miraculous. At the end of the first week a spot of colour appeared in the patient's cheeks, and his red cell count had increased one million. He had become rational, but had no recollection of his return trip from Montreal or of Dr. Murphy's visit, so serious had been his condition. By the end of five weeks his cheeks were rosy, his blood count was normal, and he was able to resume most of his activities.

The sequel is almost as dramatic. In the next house to the patient's lived a lady whose home was Saint John, New Brunswick. She was a friend of the wife of one of Saint John's leading doctors who himself was suffering from pernicious anaemia and rapidly going downhill despite repeated blood transfusions and treatment both in Saint John and Montreal. I had seriously considered writing to him and suggesting a trial of the liver treatment, but it was one thing for a very recent graduate to advise this for his own patient in a small town, and quite another thing for him to write to a much older and more experienced medical man who was being treated by the best the country could offer. However, the matter was taken out of my hands. The doctor's wife had heard through her friend of the wonderful results obtained by the use of liver and wrote me personally to find out the truth. I needed no second urging but immediately sent her a long letter explaining the case and the details of treatment and urging her to adopt the same treatment for her husband no matter what anyone said. She did so. Again the results were amazing. Dr. S. was restored to health and was able to come down the following summer, along with my patient, and both were presented at a meeting of the medical associations of Washington County, Maine, and Charlotte County, New Brunswick, as the first two patients successfully treated for pernicious anaemia in Canada.

It was not until August of 1926 that Minot and Murphy reported in the *Journal of the American Medical Association* the results of their treatment with liver extract, of 100 patients suffering from pernicious anaemia, and the control of what was once a fatal disease.

My patient is still alive and well. Dr. S. died some years ago, but not of pernicious anaemia. It was a lesson to me never to be too hasty in condemning something new. We no longer fear pernicious anaemia, but the memory of my first case and its successful treatment under Dr. Murphy's instruction is one of the highlights of my medical career.

H. S. EVERETT, M.D.,

St. Stephen, N.B.

CORRESPONDENCE

NATIONAL HEALTH SERVICE

To the Editor:

One of the most disturbing aspects of the N.H.S. to me is that many people from Britain believe that the services provided are free. A well-informed Canadian obstetrical patient of mine explained how she had had her first baby in London under N.H.S., of course, and it was all "free".

And a few months ago a young English physician explained to me that N.H.S. was free as far as the patients were concerned. The doctors were paid quarterly by the Chancellor of the Exchequer—and that was the end of that.

Now I suspect that the politicians have played up that point—it is free—but whence comes the money? There is little realization apparently that you cannot get something "free"; eventually someone must pay the bill.

In Britain N.H.S. is paid for by taxes. How else could it be? Moreover, more than 90% of the cost is borne by the general taxation fund since less than 10% of its cost is defrayed by the special weekly tax levied on its inception in 1947.

I may add also that this tax is by no means an insignificant one. It has been estimated to represent about \$80.00 (Canadian) per year, bearing in mind prices, wage scales and standards of living, etc.

Let us have no economic illusions about N.H.S. or any projected Canadian equivalent.

D. C. GEGGIE, M.D.

Wakefield, Que.,
July 24, 1956.

SPECIAL CORRESPONDENCE

The London Letter

(From our own correspondent)

PAY INCREASE CLAIM REJECTED

The Minister of Health and the Secretary of State for Scotland have categorically rejected a claim for increased remuneration submitted by the British Medical Association on behalf of general practitioners and consultants. The claim was for an increase of not less than 24%, and is described by the negotiating committee of the British Medical Association as "merely one for the implementation of a contractual obligation already in existence and which has been so since 1948". The Ministers' rejection of the claim, without even troubling to meet the British Medical Association representatives to discuss it, has naturally raised strong protests from the British Medical Association. On the other hand, it must be admitted that the rejection is not altogether unexpected. Apart from anything else, a considerable proportion of the profession was not happy about such a claim's being put forward at the present time when the Prime Minister has made such a strong plea for the exercise of discrimination and restraint in the launching of such appeals for increased pay. There were many who felt that a strong appeal for tax relief would have been more in accordance with professional standards and an equally effective way of raising net incomes.

PATHOLOGISTS' JUBILEE

The Pathological Society of Great Britain and Ireland has just been celebrating its jubilee by holding its annual meeting in Manchester, where the first meeting of the Society was held on July 14, 1906. Lorrain Smith and Robert Muir, ably assisted by Ritchie and Boycott, were largely responsible for the founding of the Society. The

Journal of Pathology and Bacteriology, the official journal of the Society, dates back to 1892. Its founder, owner and editor was Sims Woodhead, professor of pathology at Cambridge. Soon after the Society was founded, negotiations were entered into with Sims Woodhead to make it the official journal of the Society. These negotiations were successfully completed in 1907, when an association was formed to acquire the journal and to publish it under the editorship of Sims Woodhead, assisted by Ritchie and Boycott. The Society has certain features which are becoming increasingly rare in this modern age. It has no permanent president; neither does it send official representatives to conferences. At any meeting the chair is taken by the head of the laboratory, or department, in which the meeting is being held. The Society has consistently eschewed any action which might have a political flavour. Its one and only aim is, in the words of its founders, "to advance pathology and to facilitate intercourse between pathologists".

THE B.M.A. AT BRIGHTON

Another annual meeting of the British Medical Association has come and gone. This year it was in Brighton, where the scientific meetings were held in The Pavilion, that fascinating memorial of Regency profligacy, so brilliantly portrayed in Rex Whistler's mural, "The Spirit of Brighton". Thus it was that the neurologists found themselves meeting in the Queen's Bedroom, whilst the anaesthetists met in solemn conclave in the Red Drawing Room. The general practitioners were proudly sited amid the splendours of the Banqueting Room, and the physicians packed the exotic Music Room for their meetings. Perhaps it was the ghosts of the hey-day of Brighton that encouraged a paediatrician to declaim his faith in morphine as an occasional life-saving drug in case of asthma in children, and to laud the merits of light chloroform anaesthesia in controlling status epilepticus. In the solemnity of the Banqueting Room the general practitioners deprecated the use of aspirin in the treatment of virus infections, whilst the physicians learned of the value of Mersalyl in the treatment of peptic ulcer.

HYPERCALCAEMIA AND VITAMIN D

At the request of the Ministry of Health, the British Paediatric Association appointed a committee to enquire into the prevalence of hypercalcaemia in infants and the kind of diet with which it was associated. This committee has now published its report, which shows that between January 1953 and June 1955, 204 cases of hypercalcaemia had been reported. Among these reports there was no convincing evidence that, at the onset of symptoms, the infant had been entirely breast fed and had not received any vitamin D supplement. The report does not discuss the evidence whether or not vitamin D is responsible for "idiopathic hypercalcaemia", but it does state that there is a strong case for taking steps to safeguard infants against the possible risks of an unnecessarily high intake of vitamin D. It details four methods by which this could be achieved: by omitting calciferol from dried milks; by limiting the amount of calciferol incorporated in dried milk by a range of figures; by omitting cod-liver oil supplements in the case of infants fed on calciferol-fortified dried milk; and by omitting calciferol from cereals made for infants.

London, August 1956.

WILLIAM A. R. THOMSON

ABSTRACTS from current literature

MEDICINE

Coronary Arteriosclerotic Heart Disease in the Younger Age Group.

O. SAPHIR, L. OHRINGER AND H. SILVERSTONE: *Am. J. M. Sc.*, 231: 494, 1956.

Arteriosclerotic heart disease in the younger age group is not rare and a number of reports have appeared in the literature. The writers had noticed that, over the last few years, there had been a seemingly increased incidence in arteriosclerotic heart disease at necropsy on younger subjects. This feature had also been noted by older physicians whom the authors questioned. However, exact figures were not available. To ascertain whether or not arteriosclerotic heart disease in the younger age group appears more frequently now and during the last decade than during the immediately preceding two decades, the necropsy material on patients over 20 years of age at Michael Reese Hospital over the years 1920 to 1939, 1940 to 1949 and 1950 to 1953 was restudied. By arteriosclerotic heart disease, the authors mean coronary arteriosclerosis or atheromatosis with or without myocardial fibrosis or infarction. No differentiation was made in regard to the severity of lesions, and also no attention was paid to presence or absence of previous pertinent clinical findings.

Careful examination of the figures disclosed that the total arteriosclerotic heart disease frequency over the past 34 years has not changed. However, there is an increase in its occurrence in the younger age group, the most striking increase being between the ages of 40 and 50. During the same period of time the necropsy population has become increasingly older. Since arteriosclerotic heart disease among the total necropsy population has not changed appreciably, the writers feel that factors other than diet may be responsible for this increase in arteriosclerotic heart disease in the younger age group.

S. J. SHANE

Recent Advances in the Laboratory Diagnosis of Tuberculosis.

R. W. REED AND O. MORGANTE: *Am. J. M. Sc.*, 231: 320, 1956.

Recent developments in culture techniques for *M. tuberculosis* offer considerable promise for more rapid, more accurate and more dependable laboratory assistance to the clinician in establishing a positive diagnosis of tuberculosis. Charcoal agar, blood agar and serum-enriched fluid medium used for slide culture can be more easily and economically prepared and are more readily reproducible than the widely used egg-glycerin agars. These 3 methods together with membrane filter techniques look most promising today. The usefulness of dye virulence tests has not been fully established. The reliability of serological tests as aids to diagnosis and prognosis in human tuberculosis is also in question. These tests however are proving very valuable in the study of immunity to tuberculosis and may yet be adaptable as routine laboratory procedures.

S. J. SHANE

A Comparative Study of Myocardial Infarction in the White and Negro Races.

P. G. KEIL AND L. V. MCVAY, JR.: *Circulation*, 13: 712, 1956.

The records of 519 cases of proved myocardial infarction were reviewed. Of these patients 233 were white; 286 were Negro. The ratio of hospital admissions was 70:30 in favour of the Negro. The incidence of myocardial infarction in Negroes was 52% of that in Caucasians. The classical sex predominance of myocardial infarction in males was not present in Negro patients. The ratio of Negro males to females was approximately 1:1 (1.2:1), while among the white patients it was 3:1 (2.9:1).

The average age at the time of initial myocardial infarction was 66.5 years for white females, 62 years for white males, 60.6 years for Negro males, and 56 years for Negro females. Infarction occurred, therefore, more than 10 years earlier among the Negro females than among white females. This is a significant difference.

A history of angina pectoris prior to myocardial infarction was obtained in 57% of white females, 48% of white males, 32% of Negro males and 26% of Negro females. Angina, therefore, occurred more than twice as frequently among white as among Negro females. This is a significant difference.

The highest mortality rate in the present study occurred among the Negro females (77%). Four times as many Negro as white females reported a history of pelvic surgery during the child-bearing years. All cases were analyzed with regard to obesity, diabetes mellitus, hypertension, and family history of cardiovascular disease. No significant racial variation was observed. Myocardial infarction in the Negro female deviated significantly from the classical description of this disease. Further investigation of coronary artery disease in the Negro female is essential and may provide basic information concerning the pathogenesis of this disease. S. J. SHANE

Effect of Intermittent Heparin Therapy on the Course of Human Coronary Atherosclerosis.

H. ENGELBERG, R. KUHN AND M. STEINMAN: *Circulation*, 13: 489, 1956.

The effect of prolonged, intermittent heparin therapy was evaluated over a period of two years in a large number of patients who had previously sustained a myocardial infarction.

There were four deaths due to cardiovascular disease in a group of 105 patients (average age 62.6 years) who received 2,067 months of heparin therapy (200 mg. concentrated aqueous heparin given subcutaneously twice weekly). In a comparable control group of 117 individuals (average age 61.7 years) who received 2,183 months of placebo therapy there were 21 deaths due to cardiovascular disease. The observed difference in deaths between the two groups is statistically significant ($p < .01$).

When heparin is given as described, therapeutic anticoagulant levels are not maintained. Clotting time tests are therefore unnecessary. The results indicate that heparin, in the dosage and manner administered, retards the progress of atherosclerotic disease in patients with coronary atherosclerosis. S. J. SHANE

Observations on Angina Pectoris During Drug Treatment of Hypertension.

W. E. JUDSON, R. HOLLANDER AND R. W. WILKINS: *Circulation*, 13: 553, 1956.

In recent years several potent blood-pressure-lowering drugs have become available for the treatment of arterial hypertension. Although extensive clinical trials with these hypotensive agents have proved their therapeutic effectiveness in reducing blood pressure in certain hypertensive patients, some of them may produce adverse cardiovascular effects. In a long-term, careful study of a group of hypertensive patients, the oral administration of hydralazine (Apresoline) or ganglionic blocking agents (hexamethonium, pentolinium) was found occasionally to precipitate an attack of angina pectoris. In addition, an increased incidence of anginal complaints was observed during continuous chronic oral hydralazine therapy. The present study was undertaken therefore to determine the mechanisms by which such hypotensive agents might induce coronary insufficiency.

The data suggest that coronary insufficiency occurring in hypertensive patients with coronary artery disease during treatment with different hypotensive drugs may result from several different haemodynamic mechanisms. Coronary insufficiency (angina) after the administration of hydralazine does not result solely from a reduction in

the aortic perfusion pressure but also from increases in cardiac output and pulse rate. Coronary insufficiency after the administration of hexamethonium, on the other hand, results primarily from a reduction in the aortic perfusion pressure during the severe hypotension (especially postural hypotension) which this drug produces. Hexamethonium was found not to block the anginal effects of hydralazine.

Intravenous hydralazine is a powerful agent capable of inducing subjective and objective evidence of coronary insufficiency. However, the severity and duration of the reactions to this drug appear likely to preclude its general clinical use as a test for coronary artery disease.

S. J. SHANE

Studies on the Control of Hypertension. VI.

H. M. PERRY, JR. AND H. A. SCHROEDER: *Circulation*, 13: 528, 1956.

Because doses of antihypertensive agents necessary to keep human arterial hypertension at relatively normal levels were observed to decrease with time, the records of 114 patients receiving oral hexamethonium chloride and hydralazine (but no other drugs) were analyzed by these authors. These patients, with hypertension of various degrees of severity, had been followed up closely during at least one year of carefully controlled therapy with these drugs.

At the end of this period, 79 patients who had maintained diastolic pressures below 100 mm. Hg required only 73% of their initial dose of ganglionic blocking agent. Seventy-eight cases were similarly followed up for 2 years, and 37 for 3 years. The findings in these patients were similarly analyzed, and reinforced the suggestion that, after normotension or near normotension, the required dosage of antihypertensive drugs diminished with time; whereas with less adequate control of blood pressure the required dosage remained unchanged.

In 19 patients who had been rendered normotensive, this trend had extended to the point of complete discontinuation of hexamethonium chloride and in 10, to the discontinuation of hydralazine as well, without a recrudescence of hypertension. This lessened need for drugs may indicate that the hypertension slowly alters to a stage less severe than the first. S. J. SHANE

Adrenocortical Steroids and Tuberculosis: A Reminder.

I. M. GOLDING, W. LESTER AND G. S. BERG: *New England J. Med.*, 254: 1026, 1956.

Four cases are reported in which pulmonary tuberculosis became activated during the administration of adrenocortical steroids. When steroid therapy is being administered, cases should be followed up by routine chest films, and if there is any question of tuberculous infection the patient should at the same time receive routine antituberculous medication. NORMAN S. SKINNER

Arterialization of the Coronary Sinus in Occlusive Coronary Artery Disease.

A. A. BAKST AND C. P. BAILEY: *J. Thoracic Surg.*, 31: 559, 1956.

The retrograde blood flow and oxygen content of the blood from the peripheral segment of a ligated and transected circumflex artery were determined in dogs in which the coronary sinus had been arterialized for a period of one year. These determinations were performed with the graft open and closed. With the graft open, coronary sinus pressure was within the range of that of the systemic circulation, and the coronary sinus blood was of high oxygen content. When the graft was occluded, the coronary sinus pressure and blood oxygen content reverted to normal.

With the graft open, retrograde circumflex coronary arterial blood flow averages 6 c.c. per minute. This represents a threefold increase over that expected in the control animal, but is less than that previously

found in the two and six month groups of animals. This blood is arterial in nature, approximating in oxygen content to aortic blood. The retrograde flow is probably due to an increase in the intercoronary arterial collateral circulation.

Occlusion of the aorticocoronary sinus vein graft does not significantly alter these findings. This indicates that after one year, the vein graft no longer contributes to the interarterial collateral circulation and is dispensable.

The mortality rate after circumflex coronary arterial ligation is 66% in the one-year group of animals, which is unchanged from that previously reported in the six-month group of animals. Retroperfusion of the myocardial capillary bed could not be demonstrated in this group of animals.

S. J. SHANE

SURGERY

Surgical Treatment of Acute Rupture of Abdominal Aortic Aneurysms.

T. FARRAR *et al.*: *Proc. Staff Meet. Mayo Clin.*, 31: 299, 1956.

Acute pain in the abdomen or back in the presence of an abdominal aortic aneurysm usually indicates sudden expansion of the aneurysm or rupture into the retroperitoneal tissues. An abdominal aortic aneurysm occasionally may not cause any symptoms until sudden fatal rupture has occurred. In such cases, the aneurysm ruptures into the free peritoneal cavity or, rarely, into a hollow viscus. Previous writers have indicated that acute paroxysmal pain arising from an abdominal aortic aneurysm is usually present for several days or even weeks or months before fatal rupture, and that most patients with abdominal aortic aneurysms die within three months of the onset of the severe symptoms.

It is only within the past four years that a successful operative procedure has been devised, and two such cases are reported in this paper. In both cases, the rupture was retroperitoneal and tamponade by unyielding tissues had prevented fatal haemorrhage. Both patients were given emergency treatment for shock and haemorrhage, and then immediately taken to the operating room. In one patient, a prosthesis of nylon cloth was used to bridge the defect after resection of the abdominal aortic aneurysm; while in the second patient, an "ivalon" prosthesis was equally satisfactory. Both patients did well after the emergency procedure and are still living 18 months and 9 months, respectively, since their operations.

These experiences indicate that successful resection of a diseased segment of aorta and replacement with an aortic homograft or a suitable prosthesis is distinctly possible in the emergency presented by the acute rupture of an abdominal aortic aneurysm. As is to be suspected, the mortality rate and incidence of loss of limbs in the emergency group are greater than in patients having elective operations. However, since the future of untreated patients is hopeless, emergency resection and grafting for acute rupture of an abdominal aortic aneurysm are justified.

S. J. SHANE

Problems of Disaster Planning.

F. B. BERRY: *Ann. Surg.*, 143: 566, 1956.

The Assistant Secretary of Defense in Washington, D.C., has reviewed the lessons to be learned from Operation Alert, Nagasaki, Hiroshima, the German Civilian Defence Division, the San Francisco disaster of 1906 and World War and Korea experiences to point out some of the general problems affecting the medical profession in the event of an attack on this continent by nuclear weapons.

Triage (the sorting of wounded) should be under the direction of a surgeon who has had war experience. Surgical lag is to be avoided and the lightly wounded should be quickly attended to so that they may become useful after a short period. The severely wounded should

be evacuated from the stricken area. Maximum economy means avoiding the use of trained professional individuals for first-aid, rescue, transportation and the conservation of supplies. Emergency care consists of the control of haemorrhage, artificial respiration and maintenance of airway, primary control of sucking wounds of the chest, major amputations and emergency splinting of fractures. Patients are divided into four categories: (1) lightly wounded, to be returned to duty after quick treatment; (2) immediate treatment, such as haemorrhage, incomplete amputation, shock, and open fractures; (3) delayed treatment such as closed fractures, moderate lacerations, and non-critical head injuries; (4) expectant treatment such as penetrating abdominal wounds, multiple severe injuries and severe burns. Group 4 patients should be evacuated outside the disaster area as soon as possible, for their chances of receiving adequate treatment early are poor there.

Intravenous fluids will be difficult to administer, with shortage of expert personnel and equipment, and patients must be urged to help themselves and each other. The amount of transfusions required averages a unit per wounded person: none for some, many bottles for a few.

Initial surgical treatment should certainly include no suturing, except about the face. Incision and drainage and immobilization of the wounded part is all there is time for. Definitive care of the few must not retard sound initial care for the many. The initial treatment of large numbers of burns will have to be by open methods: baking soda, copper or aluminium powder.

Problems of preparation are great. Over-all direction and organization should be unified; storing and disposal of supplies needs planning. There should be universal immunization against tetanus and tagging for blood type.

BURNS PLEWES

Burns in Children.

H. S. ALLEN AND S. W. DAY: *A.M.A. Arch. Surg.*, 72: 788, 1956.

Trauma is now the greatest cause of infant and childhood mortality and morbidity; of the forms of trauma, burning is the most frequent. The relatively thin epidermis of the child does not withstand hot liquids and other burning agents as well as that of an adult and consequently the resulting destruction is deeper. Moreover, as the ratio of blood volume to surface area is much less, children may more frequently develop shock with burns of less than 25% surface area.

In addition to thorough cleansing of the area, using soap and sterile lukewarm water, the authors advocate removal of all the blebs and loose tissue. Following this, bulky, firm dressings are applied to provide immobilization as well as occlusion, rather than exposure, which is considered impractical in this age group. The desirability of digitizing hand dressings and immobilizing in position of function, is emphasized in order to prevent intertriginous macerations and contractures.

We are again reminded that a careful correlation of the urinary output and specific gravity with clinical and laboratory procedures is of paramount importance in maintaining proper fluid and electrolyte balance. Hourly output, collected by an indwelling catheter, should be approximately 15-35 c.c. with a specific gravity of about 1.016. It is to be remembered that the normal range of haematocrit readings in children is also somewhat lower, i.e. 35 to 40%. The authors stress the importance of starting a high caloric, high protein diet supplemented with vitamins at the earliest moment, with tube feedings if necessary.

If the layer of petrolatum gauze is adherent to the area at the time of the initial dressing (on about the fifth post-burn day), it is not removed, but the burn is again dressed to be re-evaluated a day or so later. A dry and adherent gauze is often an indication of second-degree burn. If it is removed, damage is likely to result by the tearing away of regenerating epithelium. It is stated that "a whole thickness burn appears either as a dry, hard, charred, anaesthetic eschar depressed below

the surrounding skin, or as a frank necrosis with moisture and sloughing". Early removal of this necrotic tissue by surgical excision is often indicated but its inherent dangers in some cases must be considered, compresses and soaks being sometimes safer.

Various technical aspects of grafting are considered, as well as the handling of subsequent dressings. We are reminded of the danger of cutting too thick a graft, especially in the young child. Reference is made to the practice of delaying skin grafting for 24 to 48 hours after excision if this is necessary in the critical patient or to ensure adequate hæmostasis. One of the discussers raised the important question of thoughtfulness and foresight in the selection of donor sites, and of ensuring that certain areas, such as face, neck and flexor surfaces, be given first priority for coverage.

ALLAN M. DAVIDSON

Experimental Hæmorrhagic Pancreatitis. New Concepts of Pathogenesis.

A. A. STEIN, S. R. POWERS AND H. H. BROWNE: *Ann. Surg.*, 143, 508, 1956.

Experiments on dogs showed that pancreatic duct obstruction, or a source of active trypsin, produced mild reversible interstitial pancreatitis. Combined in various ways, these procedures resulted in acute hæmorrhagic pancreatitis. Morphine may be a cause of sphincter of Oddi spasm, or the pancreatic duct may be ligated. Trypsin may be made available by intravascular injection, by splenic infarction or by the reflux of bile into a prepared common channel (pancreatico-choledochostomy).

Following pancreatic duct obstruction through the ducto-interstitial pathway, there is an increase in the level of pancreatic enzymes in the interstitial tissues of the pancreas. If at this time trypsin is available, acute hæmorrhagic pancreatitis will result. It is felt that chronic sclerosing pancreatitis is the healed or healing stage of acute hæmorrhagic pancreatitis.

BURNS PLEWES

OBSTETRICS AND GYNÆCOLOGY

Post-Menopausal Oestrogen Production

R. A. STRUTHERS: *Brit. M. J.*, 1: 1331, 1956.

Postmenopausal production of oestrogen was measured in a series of 353 women. The production of oestrogen was found to be high, 53% of women showing evidence of considerable oestrogenic activity and only 20% showing none at all. Oestrogen production was not affected by the manner in which the menopause was achieved. Neither the ovary nor the adrenal was found to be a significant source of oestrogen after the menopause.

Oestrogen did not appear to have an important part to play in either breast or female genital tract cancer.

ROSS MITCHELL

ORTHOPÆDICS

Lumbar and Sacral Compression Radiculitis (Herniated Lumbar Disk Syndrome).

D. MUNRO: *New England J. Med.*, 254: 243, 1956.

Records are reviewed of 545 patients with low lumbar and upper sacral compressive radiculitis admitted to the neurosurgical service of the Boston City Hospital between 1937 and 1955. While the most common cause of the condition is extrusion of a ruptured intervertebral disk, many other possible causes exist. All patients with low back pain require careful investigation, which should include myelography. The author finds Pantopaque the most satisfactory myelographic medium.

After the diagnosis of compressive radiculitis is made, trial of conservative therapy (bed rest, traction, hyperextension of the spine and physiotherapy) is indicated before surgery is undertaken. If symptoms persist, operation is essential. At operation exposure must be adequate, nerve roots must be freed of all compression, and hæmostasis must be complete. Interarticular facets may

be sacrificed if necessary for adequate exposure. Spinal fusion is practically never indicated.

Postoperative convalescent therapy is very important, with careful supervision of the patient's activities and with gradual institution of physiotherapy. Long-standing muscular spasm and atrophy must be relieved and neurotic trends in the patient avoided. For the remainder of his life the patient should avoid any kind of job which requires lifting, jumping, pulling or pushing or working with his back in a strained unnatural position for even relatively short periods.

NORMAN S. SKINNER

Involvement of the Spinal Cord by Intervertebral Disk Protrusions.

J. E. A. O'CONNELL: *Brit. J. Surg.*, 43: 225, 1956.

Protrusion of an intervertebral disk into the spinal canal is a space-occupying lesion but differs from a spinal tumour in several ways. It is not neoplastic. It may develop suddenly and its accommodation is not easily possible, especially as it is more rigid than a neoplasm. It thus produces acute distortions in small areas of the cord or may more slowly compress it. It may interfere with blood supply or section nerve fibres to produce permanent loss of function. Volume for volume, disk protrusions at operation appear to have produced a more severe neurological disturbance than benign extra-medullary neoplasms. The differential diagnosis of cervical spondylosis and cervical disk protrusions is emphasized, for they differ in pathology, clinical features and therapy.

The records of 14 cases of compression of the spinal cord in the cervical, dorsal and lumbar regions by intervertebral disk protrusions are analyzed.

BURNS PLEWES

INDUSTRIAL MEDICINE

Local Cold Injury. A Critical Review.

R. B. LEWIS: *Am. J. Phys. Med.*, 34: 538, 1955.

Medical history indicates the extensive toll of casualties from cold. In this critical review of local cold injury the author includes information as reported in the literature by a large number of investigators. Details are presented under the following headings: predisposing factors, acclimatization to cold, classification, pathogenesis, signs and symptoms, sequelæ, and therapy.

Cold injuries have been classified on the basis of severity. Among the factors favouring them are mechanical interference with the blood flow to a cold-exposed extremity, cold windblast, and the nature of the medium conducting heat from the exposed part. The importance of fatigue and malnutrition has yet to be determined.

The pathogenesis is not clearly understood. There are in general two schools of thought. One group believes that the tissue damage is secondary to injury of blood vessels; the other maintains that cold acts directly on tissue cells to produce a true thermal injury. Many actual cases and much experimental work are reported and discussed, but the results do not permit of definite conclusions regarding the role played by the vascular changes in cold injuries.

Discussion of the acute signs and symptoms is separated from that of late secondary sequelæ, as two different problems are involved in treatment. The former do not differ qualitatively from the signs and symptoms of "trench foot" (immersion foot). Of the latter the distant sequelæ—the changes in the kidney—are very important. Adrenal stimulation too has been noted. There is much disagreement with regard to therapy. Both clinical trials and animal experimentation have produced proponents of almost every type of therapeutic procedure—procedures to attack vascular abnormalities and procedures to prevent coagulation. Experimental work has been done on the use of various drugs including among others, heparin, Hydergine, rutin, Benadryl, nicotine and ACTH.

From the evidence so far reported it would seem that except for rapid warming, specific therapeutic procedures

are of little or no value. The experimental evidence is so strongly in favour of rapid thawing that it must be adopted clinically. It must, however, be remembered that physical conditions under which natural cold injury occurs are so variable that in most instances it is very difficult, if not impossible, to compare accurately the results with untreated cases. MARGARET H. WILTON

Safe Handling of Toxic Materials by the Pest Control Operator.

W. A. COOK: *Indust. Med.*, 25: 205, 1956.

This is a discussion of the proper precautionary measures to be observed by the pest control operator in the formulation and application of pesticide operations. Success in controlling these operational hazards lies in the use of common-sense procedures based on a knowledge of the materials being used.

The hazards encountered in handling pesticides at the operator's premises together with known experience are reviewed under the following headings: chlorinated hydrocarbons, organic phosphates, other organic compounds and botanicals, inorganic insecticides, rodenticides, fumigants, and general precautionary measures. More is known of DDT than of other chlorinated hydrocarbons. Although experience with it has been good, it is emphasized that careless habits should not be permitted to cause unnecessary exposure to this or other toxic pesticide. Of the organic phosphates one of the less toxic, "malathion", has been approved and is now commercially available. Another, "diazinon", has recently been approved for limited use. The principal rodenticides and the principal fumigants used at the present time by the PCO's, such as thallium sulfate, 1080, ANTU, hydrocyanic acid gas and methyl bromide, must also be thoroughly understood. The necessary precautions based on this knowledge should be followed at the headquarters of the PCO. The control measures discussed include segregation, enclosure, general and local ventilation, wet methods, and personal protection.

The health hazards of the service men applying the insecticides and rodent baits do not appear to be considerable. The potential danger in driving to the location with the galvanized cans of insecticide solution in the car must be recognized. A leak inside a closed car is dangerous. Other hazards are described under the headings: insecticide application, rodenticide application, and fumigant application.

So far no studies have been published of actual exposure to chlorinated hydrocarbon insecticides under normal operating conditions. The author considers it probable that the amounts of these materials absorbed by PCO's are not excessive. Any irritation of eyes or nose and upper respiratory tract should be alleviated. Under certain conditions a respirator should be worn.

When reasonable care is used, such as washing the hands before eating, the service man encounters little danger of poisoning when placing rodent bait. The principal hazard is during the application of fumigants. Fatal cases have been reported from handling both cyanide compounds and methyl bromide. In using cyanide in any form, the detailed procedures and precautions available from the suppliers should be meticulously followed. Any official regulations should be observed. For example, no fumigator should work alone. Very detailed precautions are outlined for the protection of the PCO who is handling special forms of this substance. With regard to methyl bromide the U.S. Public Health Service has stated that "in view of the tremendous quantities of methyl bromide used in past years for fumigation purposes, the number of accidents for such use is small indeed, indicating that methyl bromide may be used safely if certain precautions are observed". Here also the author stresses the necessity of adhering strictly to directions. MARGARET H. WILTON

FORTHCOMING MEETINGS

CANADA

L'ASSOCIATION DES MÉDECINS DE LANGUE FRANÇAISE DU CANADA, 26th Congress, Jasper Park Lodge, Alberta. (Dr. Joseph P. Moreau, Apt. 4, Le Marchand Mansion, 116 St. at 100th Avenue, Edmonton, Alta.) September 13-16, 1956.

INDUSTRIAL SECTION, ONTARIO MEDICAL ASSOCIATION, AND INDUSTRIAL MEDICAL ASSOCIATION OF THE PROVINCE OF QUEBEC, Combined Annual Meeting, Hamilton, Ontario. (Dr. Glenn Sawyer, Executive Secretary, Ontario Medical Association, 244 St. George Street, Toronto, Ont.) September 26-28, 1956.

NINTH INTERNATIONAL CONGRESS OF RHEUMATIC DISEASES, Toronto, Ontario. (Ninth International Congress of Rheumatic Diseases, P.O. Box 237, Terminal "A", Toronto, Ont.) June 23-28, 1957.

UNITED STATES

INTERNATIONAL COLLEGE OF SURGEONS, 10th International Congress, Chicago, Illinois. (Dr. Max Thorek, 1516 Lake Shore Drive, Chicago, Ill.) September 9-13, 1956.

INTERNATIONAL CONGRESS OF CLINICAL CHEMISTRY, New York, N.Y. (Mr. J. C. Reinhold, 711 Maloney Building, Hospital of the University of Pennsylvania, Philadelphia 4, Pa.) September 9-14, 1956.

OTHER COUNTRIES

SECOND INTERNATIONAL CONGRESS OF DIETETICS, Rome, Italy. (Dr. Margaret A. Ohlson, The American Dietetic Association, 620 North Michigan Avenue, Chicago 11, Ill.) September 10-14, 1956.

EUROPEAN SOCIETY OF CARDIOLOGY, Second Congress, Stockholm, Sweden. (Professor K. E. Grewin, Södersjukhuset, Stockholm.) September 10-14, 1956.

25TH INTERNATIONAL CONGRESS AGAINST ALCOHOLISM, Istanbul, Turkey. (Bureau International contre l'Alcoolisme, Case Gare 49, Lausanne, Switzerland.) September 10-15, 1956.

SEVENTH INTERNATIONAL CONGRESS OF CATHOLIC DOCTORS, The Hague, The Netherlands. (Dr. Weebers, Nijmegen, Holland.) September 10-16, 1956.

SIXTH INTERNATIONAL CONGRESS OF HYDATID DISEASES, Athens, Greece. (Professor B. Kourias, Croix-Rouge Hellenique, 1 rue Mackenzie King, Athens.) September 14-16, 1956.

FOURTH INTERNATIONAL CONGRESS OF INTERNAL MEDICINE, Madrid, Spain. (Sociedad Espanola de Medicina Interna, Montalera 90, Madrid.) September 19-23, 1956.

MEDICAL WOMEN'S INTERNATIONAL ASSOCIATION, Extraordinary General Meeting, Bürgenstock, Switzerland. (Dr. Janet Aitken, 30a Acacia Road, London, N.W. 8, England.) September 21-23, 1956.

THIRD EUROPEAN CONGRESS OF ALLERGOLOGY, Florence, Italy. (General Secretary, Professor Umberto Serafini, Istituto di Patologia Medica, Viale Morgagni, Florence.) September 26-29, 1956.

INTERNATIONAL SOCIETY FOR THE HISTORY OF MEDICINE, 15th Congress, Madrid and Salamanca, Spain. (Dr. F. A. Sondervorst, Secretary General, 124 Avenue des Alliés, Louvain, Belgium.) September 26-29, 1956.

OBITUARIES

DR. ROBERT W. DAVIS, a retired physician and surgeon of Toronto, Ont., died at St. Michael's Hospital, Toronto, on July 18. He was born at Seaforth, Ont., and graduated from the University of Toronto in 1909. He set up practice at Mindemoya, on Manitoulin Island. In 1913 he built his own hospital there and ran it until 1934, when it was taken over by the Red Cross. From 1934 until his retirement last year Dr. Davis practised in Toronto.

He is survived by his widow.

DR. HILTON SAMUEL GOOD, 61, a urologist at Regina, Sask., died in Regina on July 16. Dr. Good was born at Lenore, Man., and graduated from the University of Manitoba in 1921. He practised at Shaunavon, Sask., before moving to Fort San, where he was the originator of the travelling x-ray vans in the province. In 1940 he went to Regina, where he practised until a short time before his death.

Dr. Good is survived by his widow, two daughters and two sons.

DR. HERVEY LEE JACKES, 67, a well-known surgeon at Vancouver, B.C., died on July 18. Dr. Jackes was born in Toronto and graduated from the University of Toronto in 1910. During World War I he served in England and France with the Field Ambulance Corps. After the war he set up practice at Regina, where he remained until 1945. In that year he was appointed surgical consultant at Shaughnessy Hospital, Vancouver, B.C., and was largely responsible for the reorganization of the hospital's surgical services. He was a Fellow of both the Royal College of Surgeons of Canada and the American College of Surgeons.

Dr. Jackes is survived by his widow, a daughter and a son.

DR. PATRICK H. MALCOLMSON, 49, a specialist in radiology and pathology at Edmonton, Alta., died at his home there on July 13. He was born at Frank, Alta., and graduated from the University of Toronto in 1930. In 1933 he began practice at Edmonton. During World War II he served overseas with the R.C.A.M.C. After his return he resumed practice at Edmonton.

Dr. Malcolmson is survived by his widow, two daughters and a son.

DR. NORMAN MURTAUGH, an obstetrician at Windsor, Ont., died suddenly in Detroit on July 28 at the age of 39. He was born at Iroquois Falls, Ont., and graduated in medicine from Queen's University, Kingston, Ont., in 1942. After graduation, Dr. Murtaugh interned at the Hôtel Dieu, Windsor, for one year. He then spent three years with the Canadian Army Medical Corps. After another year's internship at Staten Island, N.Y., Dr. Murtaugh set up general practice at Craik, Sask. Three years ago he went to Windsor and at the time of his death was chief resident of the house staff at St. Joseph Mercy Hospital, specializing in obstetrics and gynaecology.

Dr. Murtaugh is survived by his widow, two sons and three daughters.

DR. HUGH CHARLES O'ROURKE, 55, a general practitioner at Mulgrave, N.S., died suddenly on July 12. He was a native of Northern Ireland, and graduated from the National University of Ireland, Dublin, in 1930. He practised in London, England, before coming to Canada in 1947.

DR. FREDERICK W. ROLPH, 76, a retired Toronto physician, died suddenly at his home on July 31. Dr. Rolph was born at Markham, Ont. He graduated from the

University of Toronto in 1905 and did postgraduate work at Heidelberg, Germany. He was a Fellow of the Royal College of Physicians of Canada.

He is survived by a sister and three brothers.

DR. JOHN FENTON ARGUE—AN APPRECIATION

Some men are outstanding because of their force of character, their quick perception of right and wrong, their probity and their stability. Such a person was Dr. John Fenton Argue who died on July 15, 1956. He was a doctor who gloried in being a "common or garden variety general practitioner" though there was little that was common about him. His sphere of activities, medical and non-medical, extended country-wide. To the end, he never lost interest in things and people and happenings around him even when his lack of physical strength denied him the pleasure of joining them.

Dr. Argue was born in 1871, graduated from McGill University in 1896 and began practice in Ottawa in 1897. His energy and his wide interests led him outside his successful practice. He was a medical officer of health; gaol physician; medical officer in World War I; member of the Ottawa Public Library Board; member and in 1921 President of the Council of the College of Physicians and Surgeons of Ontario; President of the Ontario Medical Association 1924; President of his local Medico-Chirurgical Society in 1914; Registrar of the Medical Council of Canada 1929 to 1954; successively Secretary and President of the Canadian Medical Protective Association 1905 to 1956.

Dr. Argue was a big man with a commanding presence. His brusque manner never quite concealed the kindly, loyal man who had a sure instinct for the right and for professional and ethical propriety. Improper behaviour by doctors had to be proved before he believed it; but when he had been convinced, his indignation was great and, to an unfortunate culprit, his comments were memorable. He believed the high privilege of being a doctor carried equally high obligations.

His friendships were wide and he nurtured them; his hobbies were his own, local history, the history of the medical profession in Canada, a collection of barometers and thermometers. He was an affectionate and a protective husband and father.

The profession, mourning him, can be grateful that his influence was exerted so widely and so long. T.L.F.

DR. GEORGE YOUNG—AN APPRECIATION*

A colleague writes:

"The passing of Dr. George Sills Young has removed a man who during his long lifetime made a contribution to the medical profession which few can equal. As a teacher, as an officer of medical organizations and, above all, as a practising physician, he exemplified all that is implied in the phrase, 'the good doctor'. Quiet and courteous, he brought to bear on the problems which confronted him the power of a first-class intelligence and in the process earned the respect of all who knew him. Wisdom and integrity were his characteristics.

"Dr. Young occupied the key position of Chairman of the General Council of the Canadian Medical Association from 1934 to 1938 and all those who sat under his benevolent guidance will recall the sagacious leadership which he gave. He was never elected to the Presidency of the C.M.A., an honour which he richly deserved, mainly because at the appropriate time he became President of the Royal College of Physicians and Surgeons of Canada and served in that capacity from 1937 to 1939.

"George Young's contribution to the medical profession of this country should not soon be forgotten and should remain as an inspiration to his juniors."

*An obituary notice was published in the July 15 issue (p. 163).

PROVINCIAL NEWS

BRITISH COLUMBIA

The Annual Meeting of the Canadian Medical Association, B.C. Division, will be held in Victoria, October 2-5, and arrangements for it are well under way. Election of delegates for the coming year are being held; ballots have gone out to every member of the Division.

The program is one of great interest. Dr. E. W. Boak, President, will be in charge of proceedings. Victoria will provide many speakers: there will be round table conferences and the entertainment program looks wonderful.

The guest speaker at the Annual Dinner on Friday night will be Mr. Bruce Hutchison, the well-known Canadian author.

The B.C. College of Physicians and Surgeons will hold its Annual Meeting during this week also. A notable feature will be the burning of the mortgage held on the Academy of Medicine Building in Vancouver which is the headquarters of the medical profession of British Columbia. This building was completed in 1951 at a total cost of about \$175,000 of which \$110,000 was borrowed on mortgage from the Great West Life Assurance Company. This mortgage has now been completely paid off, and the building is the unencumbered property of the College of Physicians and Surgeons.

It is anticipated that Dr. H. H. Milburn of Vancouver, who was the prime mover in the inception of this building and its coming into existence, will be prominent in ceremonies attending this event.

The B.C. Research Council associated with the University of British Columbia has added a new wing to its building on the campus. This will provide extra floor space, and certain departments, especially biology, whose present space will be tripled, will benefit greatly thereby.

Established some 20 years ago, to deal with industrial problems mainly, this organization has become one of the busiest parts of the University. It handles about 100 enquiries a month. True, these deal mainly with industry but problems in such subjects as biology and agriculture are also being dealt with.

Mount St. Joseph's Hospital in Vancouver has just completed a new wing, at a cost of \$600,000. This wing will provide 56 extra beds for the hospital's use: of these, 32 will be for acute and 24 for chronic cases. Among the guests at the formal opening ceremonies was the Consul-General of China, Mr. Wei Huseh Chih. Mount St. Joseph Hospital is a development from a small dispensary that was opened in the East End of Vancouver 32 years ago to help the ill and aged Oriental patients; and it did magnificent work. The Missionary Sisters of the Immaculate Conception have been in charge of this work, and their Order built, and has now enlarged, the Mount St. Joseph Hospital.

The Chinatown Lions' Club gave \$1,200 for furnishings to the new wing. The secretary of the medical board is Dr. W. S. Leung, who spoke. Mr. Tim Louie is chairman of the hospital board of management. Mount St. Joseph's Hospital has gradually emerged from a very small beginning into the ranks of the major hospitals of Vancouver. It has its own hospital (medical) staff and all work is carried on under strict supervision.

The retirement of Dr. W. E. Ainley of Vancouver from active practice brings to an end the medical activities of one of the most valuable members of the medical profession. We use the "valuable" because of the quality of Dr. Ainley's work, and because of his services to medicine apart from his work. Dr. Ainley graduated in 1903 from McGill, and so has been in practice over 50 years. He began early to specialize in otorhinolaryngology, and his work was most highly regarded by all his colleagues.

Many years ago, the Vancouver Medical Association organized a benevolent fund for the relatives or connections of medical men who had died, or come upon misfortune. Dr. Ainley was elected chairman of the committee administering the fund, and he took to this work with the greatest interest and sympathy; through the years he administered it (for this is largely a one-man job) with the greatest kindness and generosity tempered with intelligent firmness—this type of work needs all these qualities—added to a capacity for keeping his counsel, which "Bill" Ainley, who would rather do anything than talk, possesses in the highest degree.

The benevolent fund, after passing through many stages of growth, is now a function of the College of Physicians and Surgeons, and Dr. Ainley stayed with it under this management for a year or two. He has, however, decided to retire from the Committee—a matter of keen regret to those who know him. His place has been taken by Dr. Dan Busteed who has worked with him for years on the Committee.

The medical profession of B.C., and particularly Vancouver, was deeply shocked and grieved by an accident occurring early in the month, when Dr. Frederick Brodie, his wife and a friend, were in an automobile accident on the Island, in which Mrs. Brodie and the lady who was in the car with them, were killed and Dr. Brodie was seriously hurt. He has been in hospital since then, making a slow recovery. Dr. Brodie was formerly a neurologist in Vancouver and was a Past President of the Vancouver Medical Association, an Osler Lecturer (he was responsible for the inauguration of the Osler Lecture in the Vancouver Medical Association) and generally, a most active member of the medical profession. He retired to Salt Spring Island a few years ago.

J. H. MACDERMOT

MANITOBA

Led by Dr. Harry Medovy, chairman of the department of paediatrics of the University of Manitoba, a group of Winnipeg paediatricians have begun a two-year study of 1,000 premature babies born at the Winnipeg General Hospital in the past five years. The other members of the study team are Dr. J. K. Martin, associate professor of paediatrics, Dr. David Grewar, lecturer in paediatrics, and Dr. Kenneth Wylie, senior resident at the Children's Hospital. After a review of the clinical records of the premature babies, city health nurses will visit the homes of the babies by appointment. The study, which will cost about \$10,000 a year, will be financed by a Dominion-Provincial health grant.

Dr. Lionel Israels has been appointed medical director of the Red Cross blood service for Manitoba.

Dr. Rod C. Davidson has opened an office at 432 Medical Arts Building, Winnipeg, for the practice of otorhinolaryngology and endoscopy.

Dr. Emmett Dwyer has been appointed provincial commissioner of the St. John Ambulance Association with jurisdiction over Manitoba and northwestern Ontario. He succeeds Dr. K. C. McGibbon who was recently made a Knight of Grace of the Association.

Dr. C. Daniel Lees has opened an office for the practice of orthopaedic and traumatic surgery at 401 Medical Arts Building, Winnipeg.

Dr. William A. Maclean, former surgical resident, Memorial Center for Cancer, New York City, is now associated with Dr. Lloyd C. Bartlett at 325 Medical Arts Building for the practice of general and tumour surgery.

ROSS MITCHELL

ONTARIO

Dr. G. Popjak, Experimental Radiopathology Research Unit, Hammersmith Hospital, London, Eng., addressed the Physiological Society, Toronto, on Synthesis of Fatty Acids in Soluble Enzyme Preparations of Mammary Glands.

Mr. R. J. Long, administrator of North Bay Civic Hospital, has resigned to become administrator of Toronto Northwestern General Hospital. Mr. Long was administrator at the Alberta Crippled Children's Hospital, Calgary, for three years. Before that he held administrative posts at the Toronto General Hospital and the Hospital for Sick Children.

The Charles H. Best Home for elderly diabetics was opened in Parkgate in the north of England by Dr. Best in July. The other home for diabetics is the one named after Sir Frederick Banting at Kingston-on-Thames, near London.

The Ontario Government has granted \$103,000 to Guelph General Hospital for the construction of a nurses' residence with 103 beds. Lady Minto Hospital, Cochrane, received \$26,428 for renovations. General and Marine Hospital, Owen Sound, received \$20,100 for construction; St. Joseph's Hospital, North Bay, received \$15,646 and Humber Memorial Hospital, Weston, \$10,403. Hôtel-Dieu Hospital, Cornwall, was granted \$186,000 for the conversion of the old hospital into a 118-bed convalescent hospital. Niagara General is to receive \$14,733. St. Vincent de Paul Hospital, Brockville, is to receive \$8,490 for auxiliary services facilities. St. Joseph's Hospital, Blind River, gets \$4,825 and Hanover Memorial gets \$4,340. Scarboro General receives an additional \$3,150 for three active treatment beds, while Salvation Army Grace Hospital, Ottawa, gets \$333 for one nursery bassinets.

Red Cross Outpost Hospital, Red Lake, is to receive \$8,000 for the construction of accommodation for eight nurses' beds.

Federal grants to Ontario hospitals include \$172,446 to Brantford General Hospital for an addition providing space for 110 beds, 28 bassinets and an outpatient area. St. Andrew's Hospital, Midland, has been granted \$106,650 toward the cost of a new wing and the renovation of the existing hospital to provide a 47-bed chronic unit. Plummer Memorial Hospital, Sault Ste. Marie, has been granted \$3,500 for construction of additional accommodation for nursing staff.

Mr. Stanley W. Martin has been appointed executive secretary of the Ontario Hospital Association.

Dr. F. P. Dewar, chairman of the medical advisory committee of the March of Dimes, says that in clinics throughout Ontario the problem of the indigent handicapped adult who cannot be provided with the rehabilitation services he needs to become self-supporting again is such a recurring problem that the March of Dimes may expand its services to include adults handicapped by diseases other than poliomyelitis.

Members of the advisory committee include Dr. W. T. Mustard and Dr. George F. Pennal, Toronto; Dr. David M. Bean, Kitchener; Dr. Ian Davidson, Sudbury; Dr. H. I. J. Kellam, Ottawa; Dr. John C. Kennedy, London; Dr. Ernest C. Janes, Hamilton; Dr. W. J. S. Melvin, Kingston; Dr. R. R. Mutrie, Port Arthur, and Dr. R. C. Rider, Windsor.

The Charles Mickle Fellowship for 1956 has been awarded by the University of Toronto to Dr. Arnold Rich, Baxley professor and director of the department of pathology at Johns Hopkins University, and pathologist-in-chief of the Johns Hopkins Hospital.

This fellowship—the income from an endowment of \$29,000 bequeathed by Dr. W. J. Mickle—goes to Dr. Rich for his contributions to the pathology of inflammation, allergy and hypersensitivity.

It is awarded annually to the member of the medical profession considered to have done most during the preceding ten years to advance sound knowledge of a practical kind in medical art or science.

Promotions in the University of Toronto's Faculty of Medicine are: Dr. Ian Macdonald has been promoted to associate professor of medicine, and director of the newly created Division of Postgraduate Medical Education. Dr. J. V. Basmajian has been promoted to professor in the department of anatomy.

Promoted to associate professorships are: Miss M. T. Wishart (Art as Applied to Medicine); A. H. Squires (Medicine); J. H. Ebbs and L. N. Silverthorne (Paediatrics); W. L. Donohue (Pathology) and J. W. Scott (Physiology).

To assistant professorships: G. F. Lewis (Anatomy); J. M. Salter (Banting and Best Department of Medical Research); J. C. Laidlaw (Medicine); R. G. C. Kelly and J. C. McCulloch (Ophthalmology); D. B. French, G. A. Henry, and J. B. Whaley (Otolaryngology); J. D. Keith (Paediatrics) and T. C. Brown (Pathology).

To the rank of associate: H. J. M. Barnett and B. Berris (Medicine); T. C. Jewell (Obstetrics and Gynaecology); J. C. Hill (Ophthalmology); K. McAskile, A. M. McLeod and G. C. Snell (Otolaryngology); W. E. Boothroyd, A. Miller and W. B. Spaulding (Psychiatry) and R. B. Holmes (Radiology).

The Little Red Door, a travelling information unit sponsored by the Ontario Division of the Canadian Cancer Society, is adding a second grey car with red front doors which went on the road in August. Both units carry free information and films on cancer, as well as the driver-lecturers who will visit industrial plants and business and government offices.

Driver and information director for the second car is Mrs. Kathleen Rutherford, a registered nurse from Wallaceburg. She took a six-weeks training course on lay education in cancer before starting this work. There is no attempt to diagnose or treat cancer. The aim of the program is to inform people about cancer's danger symptoms and to dispel fears and misconceptions about the disease through information and education. It is not a care program. People are learning to spot danger signals and get early proper medical treatment.

LILLIAN A. CHASE

NEW BRUNSWICK

Dr. Jean Webb, consultant in the Division of Maternal and Child Welfare, Department of National Health and Welfare, Ottawa has attended the Eighth International Congress of Paediatrics in Copenhagen and is studying services for handicapped children in Britain and on the continent. Dr. Webb previously held appointments in public health in New Brunswick.

The visit of Dr. George A. Scherman and family of Lansing, Michigan, to Saint John was the occasion for a dinner sponsored by Dr. George M. White for classmates of Medicine '24 McGill resident in that city. Guests included Dr. Howard Bustin, Dr. E. C. Menzies, Dr. R. A. H. Mackeen, Dr. E. A. Petrie and their wives.

Dr. Grant Leggett of Saint John is convalescing after a short stay in the Saint John General Hospital.

At this time of year as usual, a good number of New Brunswick doctors are finding it convenient to pay their respects to the fighting, sporting Atlantic salmon and in spite of newspaper reports of damage to the fish by the bud worm spraying campaign of the forestry service,

good catches are being reported and improvement in health and morale of the vacationing fishermen will result from this interlude from practice.

A. STANLEY KIRKLAND

CANADIAN ARMED FORCES

Dr. J. Wendell Macleod, Dean of Medicine of the University of Saskatchewan, has been appointed a Member of the Canadian Forces Medical Council, replacing Dr. W. C. MacKenzie, Professor of Surgery, University of Alberta, Edmonton.

Dr. G. E. Hall, President and Vice-Chancellor of the University of Western Ontario, London, has been re-appointed as a Member of the Canadian Forces Medical Council for a further term of three years.

Dr. R. Ian Macdonald, Associate Professor of Medicine, University of Toronto, has been appointed Consultant in Internal Medicine to the Canadian Forces Medical Council.

Dr. Gilbert L. Adamson, Winnipeg, has been appointed Consultant in Psychiatry to the Canadian Forces Medical Council.

The following officers graduated in medicine in the spring of 1956 and are now posted to duty in the RCAMC (Regular): Captain D. G. Fraser; Captain S. H. Frackson; Captain D. M. Robb; Captain E. A. Smith; Captain M. K. Clements; Captain J. G. L. Slater; Captain C. E. Forbes; Captain J. D. Chaisson; Captain J. P. O'Neill; Captain J. W. Cruickshank; Captain J. Bernier; Captain R. Dupuis; Captain P. J. Ferguson and Captain H. M. McFarland.

Wing Commander H. B. Hay, D.S.O., D.F.C., C.D., who has been the R.C.A.F. Medical Liaison Officer at Canadian Joint Staff (London, England), has commenced a one-year course in Industrial Medicine at the School of Public Health, Harvard University.

Wing Commander D. O. Coons has graduated from the School of Public Health, Harvard University, and has been transferred to the staff of the Director General of Medical Services (Air) at Air Force Headquarters, Ottawa.

Wing Commander R. H. Lowry, A.F.C., C.D., who has been the R.C.A.F. Medical Liaison Officer at Canadian Joint Staff (Washington), has commenced a one-year course in Industrial Medicine at Johns Hopkins University.

Wing Commander J. C. Wickett, A.F.C., C.D., Officer Commanding the Flying Personnel Medical Establishment at the Institute of Aviation Medicine, Toronto, has been transferred to Canadian Joint Staff (Washington) as the R.C.A.F. Medical Liaison Officer.

CHANGE OF ADDRESS

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BOOK REVIEWS

ANDROGENS: BIOCHEMISTRY, PHYSIOLOGY AND CLINICAL SIGNIFICANCE. R. I. Dorfman, Research Professor, Boston University School of Medicine, and R. A. Shipley, Director, Radioisotope Unit, Veterans Administration Hospital. 590 pp. Illust. John Wiley & Sons, Inc., New York, 1956. \$13.50.

This remarkable book brings together in one volume almost all facets of the subject. The first half of the text deals thoroughly with the biochemistry and the physiology of the androgens. The last half is entirely clinical and includes normal production, the effects of androgens, the diagnosis and treatment of androgen excess and deficiency, and the use of androgens in a wide variety of clinical disorders. The chapter on 17-ketosteroid excretion in various clinical conditions covers the literature extremely well. A useful appendix gives chemical structures of all the steroids and related compounds mentioned in the text, also a description of various techniques for the extraction and analysis of the androgens.

Investigators and graduate students in the biological sciences whose research interests include the androgens will find this a valuable book. For the clinician, general practitioner or specialist, there is much of value and interest, particularly of course for the clinical endocrinologist, internist, paediatrician, urologist, gynaecologist, gerontologist and oncologist. The less hardy clinician will probably skim the biochemical section, tarry in the physiological chapters and become absorbed in the purely clinical material. In all, this is a most useful book, recommended to anyone with an interest in the androgenic hormones.

THE ROCHESTER REGIONAL HOSPITAL COUNCIL. L. S. Rosenfeld and H. B. Makover. 204 pp. Illust. Harvard University Press, Cambridge, Mass.; S. J. Reginald Saunders and Company Limited, Toronto, 1956. \$3.85.

Teamwork among several hospitals in a geographic region has long been advocated as an approach to improvement of the quality of hospital services, especially in small rural institutions. In 1946, with the aid of the Commonwealth Fund, a demonstration of such a regional hospital program was launched in an 11-county area, with nearly 1,000,000 population, around Rochester, New York. This book presents a study of the structure and development of the scheme, with evaluation of its strengths and weaknesses.

The representative composition and mode of operation of the Regional Hospital Council, which administers the program, are described. In the sphere of education, the Council promotes exchange of interns and residents, training of hospital administrators, nurses, and other personnel. A full-time medical educator is advocated by the investigators to invigorate the program of postgraduate studies for practising physicians. Advisory services are provided in hospital accounting, records, organization, etc. Some headway has been made in bulk purchasing and in studies of professional performance (medical audits). Finally, the program helped to develop improved physical facilities and a supply of medical and related personnel better adjusted to the needs of the region.

The Regional Hospital Council is believed to have had impacts beyond its own immediate program, by inducing positive steps in other fields, such as the organization of a regional blood bank and a prematurity centre. At the same time, deficiencies are found in lack of coordination with public health and medical care agencies in the area. More attention is needed, according to the investigators, in the field of chronic disease facilities and the whole problem of mental illness.

The reader in Canada, where several provinces have universal hospitalization insurance, may be surprised that the Rochester experiment has done nothing to explore the referral of patients from peripheral to central units in

a region. The flow of activities is almost entirely from the centre outward, or from the Council staff to the 31 member institutions; it is not a "two-way flow of services and patients", as has usually been theorized under the regional hospital concept. Within the framework established, however, clear qualitative improvements have resulted from the Rochester scheme, and it can serve as a model to groups of hospitals elsewhere. The authors have succinctly described a complex medical-social program with the objectivity and judgment which should make this book a standard reference for all persons concerned with improved hospital service.

CONTROLLED HYPOTENSION IN ANESTHESIA AND SURGERY. D. M. Little, Jr., Assistant Clinical Professor of Anesthesiology, Yale University School of Medicine, New Haven, Conn. 159 pp. Illust. Charles C Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1956. \$5.00.

Dr. Little has written an unbiased account of the history of "controlled hypotension"—which he defines as the deliberate induction of hypotension with the employment of postural ischaemia. This book should be of much value to the surgeon who has contemplated the use of "controlled hypotension", as well as to the anaesthetist, for it is a comprehensive review of the subject, written in a logical and interesting manner.

Beginning with a discussion of the factors involved in surgical bleeding and a chapter on the physiology of induced hypotension, there follows an outline of the various methods used to produce hypotension—arteriotomy, total spinal and ganglionic blockade. There are no minute descriptions of technique; for these the reader must search elsewhere. The author proceeds with a physiological consideration of the induced hypotensive state, with the complications which have arisen from it; the contraindications to its use are stated. Finally, the rare indications for "induced hypotension" are enumerated.

Dr. Little has written an excellent record of the subject, with an extensive bibliography referred to throughout the text, leaving the reader with a great respect for the many aspects of this controversial subject.

ERYTHROMYCIN. W. E. Herrell, Division of Medicine, Lexington Clinic, Lexington, Kentucky. Antibiotics Monographs, No. 1. Edited by H. Welch and F. Marti-Ibanez. 56 pp. Medical Encyclopedia, Inc., New York, N.Y.; Interscience Publisher, Inc., New York and London, 1955.

This handbook contains an authoritative account of the pharmacology and clinical application of this antibiotic, with a review of the literature up to October 1954. Information regarding assay methods in serum and body fluids is also given. In general the antimicrobial spectrum is very like that of penicillin, but the action is apparently bacteriostatic rather than bactericidal, which makes it unsuitable for use where local resistance factors are weak, as in subacute bacterial endocarditis. The main value of the antibiotic is in situations where penicillin is contraindicated, or when a penicillin-resistant staphylococcus is involved. Resistance to erythromycin may supervene, both in infections which are slow to clear and in carriers in a hospital. Promising initial results are reported in diphtheria carriers, patients with acute diphtheria, in amœbiasis and granuloma inguinale. The agent may be life-saving if administered promptly to patients who develop staphylococcal ileo-colitis. The diagnosis is made on the basis of examination of a stained smear of the faeces, and treatment begun without waiting for cultures. The antibiotic is not effective in meningitis. The results in pneumococcal and streptococcal infections in other areas seem quite satisfactory.

This is a useful book, but it has been written before evaluation of the antibiotic in many fields has been completed.

ATLAS OF TUMOR PATHOLOGY, Section III, Fascicle 7. Tumors of the Cardiovascular System. B. H. Landing, Pathologist, The Children's Hospital, Cincinnati, Ohio, and S. Farber, Professor of Pathology, Harvard Medical School, Boston, Mass. 138 pp. Illust. Armed Forces Institute of Pathology, Subcommittee on Oncology, Committee on Pathology, National Research Council, Washington, D.C., 1956. \$1.50.

ATLAS OF TUMOR PATHOLOGY, Section V, Fascicle 19. Tumors of the Thymus Gland. B. Castleman, Chief, Department of Pathology and Bacteriology, Massachusetts General Hospital, Boston, Mass. 83 pp. Illust. Armed Forces Institute of Pathology, Subcommittee on Oncology, Committee on Pathology, National Research Council, Washington, D.C., 1955. \$1.00.

ATLAS OF TUMOR PATHOLOGY, Section IX, Fascicle 33. Tumors of the Female Sex Organs, Part I: Hydatidiform Mole and Choriocarcinoma. A. T. Hertig, Shattuck Professor of Pathological Anatomy, and Hazel Mansell, Instructor in Pathology, Harvard Medical School, Boston, Mass. 63 pp. Illust. Armed Forces Institute of Pathology, Subcommittee on Oncology, Committee on Pathology, National Research Council, Washington, D.C., 1956. \$1.00.

These are three additional fascicles—comprehensive atlases of human pathology—published by the United States Armed Forces Institute of Pathology. They amply accomplish their purpose in providing a large collection of materials showing both common and rare conditions in which the pathology is of particular value. The text and the excellent gross and histological reproductions—in black and white as well as in colour—combine to give an effective and clear text. All the reproductions are accompanied by brief and informative legends correlating with the text, and with the bibliographic references. These fascicles are recommended for the student, the practitioner, and particularly for the pathologist and teacher.

MEDICAL HISTORY OF THE SECOND WORLD WAR. ROYAL NAVAL MEDICAL SERVICES. Vol. II, OPERATIONS. Edited by J. L. S. Coulter. 543 pp. Illust. H. M. Stationery Office, London, 1956. 2/17/6.

An amazingly large amount of material has been assembled in this book. It covers operations of the Royal Navy afloat and ashore in many parts of the world throughout the war. The first two chapters detail the work and responsibilities of the naval medical officer in time of war. The three remaining chapters review chief naval events of 1939-41, 1942-43, and 1944-45, respectively.

The story is told simply and effectively against the background which faces all seafaring men in time of war—battle and the sea. The naval medical officer's life—in battle and in shipwreck, in arctic and in tropical waters and in the long-drawn-out ordeal of being a prisoner-of-war—includes much personal suffering and hardship. The editors have not omitted to bring to life mistakes and failures. They also tell of great successes and of medical achievements. The narrative is unique in its human approach to events in which tragedy and tears are so frequently offset by the sense of humour which is so characteristic of the sailor. There are very many gripping stories told by the men who experienced the events; for instance, the fate of a party of naval personnel after the fall of Singapore, Operation "Torch" in North Africa, the loss of H.M.S.'s *Prince of Wales* and *Repulse*, convoys to North Russia, and many others. The reader will find a guiding editorial hand throughout the numerous stories that are told. It is a competent, comprehensive text and reference, and should have great utility for those interested in naval affairs.

(Continued on page 462)

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SKIN SURGERY. E. Epstein, Assistant Clinical Professor of Medicine (Dermatology), Stanford University Medical School, Stanford, California. 228 pp. Illust. Lea and Febiger, Philadelphia; The Macmillan Company of Canada Ltd., Toronto, 1956. \$7.50.

The author has filled a need for a small practical book on skin surgery. The chapters on the biopsy, electro-surgery, epilation, dermabrasion and cryosurgery are extremely practical for the average dermatologist and for some general practitioners. The chapters on skin grafting, oral surgery and excision of advanced carcinoma would be better included in a textbook on plastic surgery. Most dermatologists and general practitioners will find many valuable suggestions in this book.

THE WORK OF WHO, 1955. Annual Report of the Director-General to the World Health Assembly and to the United Nations. Official Record of the World Health Organization, No. 67. 241 pp. Illust. World Health Organization, Palais des Nations, Geneva, 1956. \$2.00.

The Annual Report of the Director-General of the World Health Organization contains much the same arrangement of material as usual. Stress is laid on the new approach to the malaria program, which has virtually been dictated by the increasing capacity of anopheline vectors to acquire resistance to insecticides. Because of this race between the technicians and the mosquitoes, the present plan is to eradicate the disease over enormous areas in the shortest possible time, wherever technically feasible.

There is a change in the attitude towards tuberculosis, because of the advances in chemotherapy. Although BCG vaccination programs are continuing as before, there is more and more emphasis on domiciliary treatment of patients in the less well developed countries, and also on surveys of prevalence of tuberculosis. The virus disease which has attracted the most attention in the WHO program is of course poliomyelitis, in which much activity has taken place in the field of vaccination and also in serology. By the end of 1955 50 million people had been examined in the course of anti-treponematoses mass campaigns and 15 million had been treated.

In all regions, WHO has continued to assist governments in establishing national health legislation, national health programs and local health services, particularly in rural areas. Attempts have also continued at the integration of such activities as maternal and child welfare into general public health programs.

In the more developed countries the changes in health services necessitated by the aging of populations have been given some attention. Atherosclerosis is one of the diseases of this group of countries which now come within the orbit of WHO's work. Emphasis on mental health has continued.

An entirely new field of activity for WHO is study and correlation of knowledge on public health aspects of nuclear energy. This is a natural field for WHO work, and will undoubtedly expand in future years.

A TEXTBOOK OF PHARMACOGNOSY. N. M. Ferguson, Dean of the College of Pharmacy, University of Houston, Texas. 374 pp. The Macmillan Company, New York and Toronto, 1956. \$7.00.

Pharmacognosy is defined as the study of drugs derived from plant and animal sources, and takes into account not only their sources and methods of extraction, but also the biochemistry and physiological actions of their active principles. This book is written from a biochemical point of view, and structural formulæ are given for most of the compounds discussed. The drugs produced by chemical modification of these natural substances are also discussed, so that the scope of the book is somewhat greater than the title suggests. Some of the newest agents which are being widely advertised to the profession are not included, but this is inevitable in these days of rapid progress. The nomenclature is scrupulously consistent, using U.S.P. and N.F. terminology. The book is primarily intended for pharmacists and pharmacologists, but will provide a useful reference source for those who practise medicine. A short list of references concludes each chapter, and the book is well indexed.

COMPLICATIONS OF REGIONAL ANESTHESIA. D. C. Moore, Director, Department of Anesthesiology, Mason Clinic, Seattle, Washington. 291 pp. Illust. Charles C Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1955. \$11.50.

Dr. Daniel Moore, who has written a number of books concerning regional anaesthesia, is one of the most skilled exponents and teachers of this type of anaesthesia on this continent.

This present book apparently grew from a seminar of such excellent teaching value that it warranted expansion and publication. At first sight, it might be considered that the material in this book would better find its place as part of previous allied texts, but on reflection it becomes apparent that it is a most worthy piece of work in its own right.

The book is divided into three sections. The first describes the various types of reaction which may occur during or after the use of local anaesthetics and associated drugs. The prophylaxis, early recognition and handling of each type of reaction are dealt with in detail. Various specific complications such as hypotension, pneumothorax, cardiac failure, pain and bleeding are taken up severally and described in similar detail.

The second part deals with the complications which might occur during or following spinal or epidural anaesthesia. These are discussed just as fully and lucidly as those complications in part one. The third section describes the more general types of complication such as the broken needle or catheter, and it refers to less specific conditions which may occur with any anaesthetic.

The book concludes with an appendix in which are enumerated and arranged in alphabetical order all the common local anaesthetic procedures, some 50 in all; with each one is listed all the possible complications which may occur in that particular instance.

The author has used great industry and care in compiling this book; it is well written and easy to understand. It is extremely well documented and fairly well illustrated and has a useful index.

The reviewer feels that if all those who use local anaesthetic drugs were to study this book, many lives would be saved.

INTRODUCTION TO HEPATIC SURGERY. H. Gans, Surgical Resident, Cincinnati, Ohio. 265 pp. Illust. D. Van Nostrand Co., Princeton, N.J.; McClelland and Stewart, Toronto, 1955. \$13.25.

There has been much interest, in recent years, in hepatic surgery. Spurred on principally by further and more daring—even heroic—attempts at radical surgery, chiefly in wider and wider efforts to resect in cancer, the surgeon is more commonly contemplating excising portions of the liver. The physiologists and the experimental anatomists have kept pace with this interest and more is being written about the basic concepts of the anatomy of that organ.

The subject is highly controversial, agreement occurring only on the opinion that much of what is commonly accepted and taught is incorrect.

The author of this book, a young man, is obviously an investigator of considerable experience and skill, as well as a clinical surgeon. The book is for the most part a review of previous writings, a discussion of experimental techniques—and a presentation of a heretofore little-stressed concept. The hepatic vein system is the primary topographical highway about which the anatomical divisions are presented. Reference is made to previous lobular and arterial anatomical divisions, and the merits of each are compared. Injection techniques of study are described in detail. The illustrations are at times difficult to follow—particularly since often the detailed texts are not adjacent.

The more directly clinical side of this problem—surgical techniques, preoperative and postoperative care and surgical indications—occupies the last third of the text.

The clinical surgeon who turns to this volume primarily for operative guidance will be disappointed. Those interested in the basic problems of understanding the anatomy of the liver as well as to a lesser extent its clinical applicability will find this scholarly work well worth reading.

(Continued on page 464)

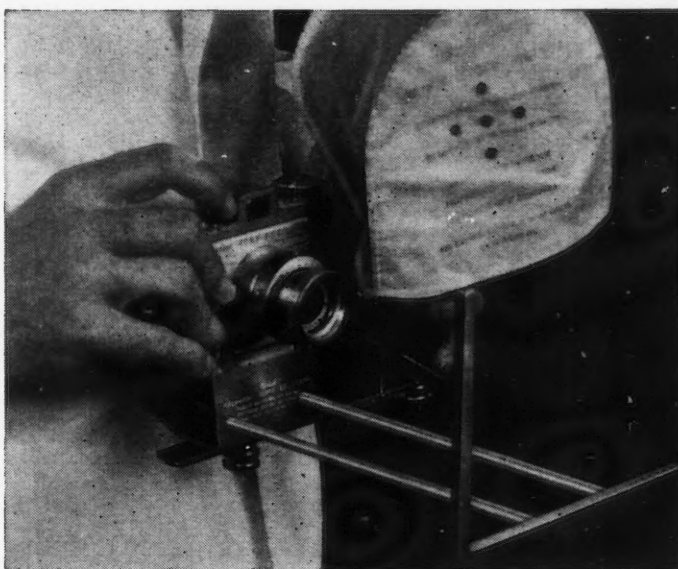
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A FOLLOW-UP STUDY OF WORLD WAR II PRISONERS OF WAR. B. M. Cohen, National Research Council, Washington, D.C., and M. Z. Cooper, Veterans Administration, Washington, D.C. 81 pp. Illust. Veterans Administration, Washington, D.C., 1954. \$1.50.

This study, conducted by the National Research Council at the request of the Veterans Administration, sought to determine the results of imprisonment in Japanese and German prison camps on white American males from the armed forces of the United States of America. The assessment was a current evaluation of these ex-prisoners in 1953, to determine to what extent prison experience had affected survival, the state of health and well-being and adjustment to civilian life and work. The Japanese and German prisoner groups were compared with each other and also with controls drawn from the armed forces which served in both the Pacific and the European area during the comparable period of time. Statistics for survival were also compared with those for white American males for the year 1949. Method of study was by questionnaire and by searching army records for hospital admissions following liberation.

Prisoners in Japanese hands averaged 38.4 months in prison camp and 34% died before liberation. Prisoners in German hands averaged 10.3 months in prison camp and only 1% died before liberation. Death from wounds prior to capture was not included.

The mortality of the prisoners of the Japanese after liberation was markedly in excess of the mortality determined from the 1949 Life Table for U.S. white males, and in excess of those who were not prisoners but who served in the Pacific, and also of those who were prisoners of the Germans. The increased mortality was largely due to tuberculosis and accident, and it was excessive during the first two years after liberation but diminished during the next four years. There was no excess of mortality amongst the liberated prisoners in Europe.

Morbidity after liberation.—During the six years after liberation there was seven times as much illness amongst the prisoners of the Japanese as in their controls, and more than twice as much illness amongst former prisoners of the Germans as in their controls. By and large, illness was determined by noting hospital admissions. The former Japanese prisoners experienced three and a half times as much illness as the German prisoners, whereas there was about the same amount of illness in their two control groups. It is interesting that venereal disease was much higher amongst former prisoners of the Japanese, although it must have been acquired after liberation.

From the questionnaire an attempt was made to determine the quality of medical care available in the prison camps. Almost all the prisoners of the Japanese felt that they needed medical treatment at some time, but over two-thirds received it only from fellow-prisoners who were physicians, and 7% received none. Of those who received attention from enemy doctors, most of them thought that the treatment was poor. One-quarter of the prisoners of the Germans felt that they needed treatment and received none, 37% were treated by fellow-prisoner physicians and 37% by enemy doctors, and one-third of the latter group felt that the treatment was good.

This report forms a basis for further study, but at present it has only touched the surface of the problem.

BEHANDLUNG INNERER KRANKHEITEN (Treatment of Internal Diseases). F. Hoff, Director of Internal Medicine, University Hospital, Frankfurt. 7th ed., revised. 653 pp. Illust. Georg Thieme Company, Stuttgart; Intercontinental Medical Book Corporation, New York, 1956. \$13.60.

This practical German guide to treatment of internal diseases has run through seven editions in 16 years and has also been translated into various other European languages. It represents a personal point of view and an attempt to give practical guidance in treatment, without too great discussion of theoretical considerations and without the listing of many alternative methods of therapy. Professor Hoff is particularly concerned to

bring before the reader methods which he himself has found effective. He does, however, give due credit to methods which have been established as successful in other persons' hands, and even contributes brief comments on such branches of the healing art as chiropractic and homoeopathy. His initial chapter on the general basis of treatment contains, flavoured with quotations from Paracelsus, many interesting comments. He makes a plea for simplicity in treatment, stating that the art of the physician consists not only in knowing what drug to give but also what drugs to withhold. Every drug implies an interference with the patient's reaction to his disease, and must therefore not be used lightly. In his general discussion of treatment, he even mentions the literature which the patient may be permitted to read.

The chapters on the treatment of special conditions reveal a conservative outlook, and some methods remain in this text which have disappeared from North American books. Examples are the use of leeches in thrombosis and of castor oil in enteritis. Many of the preparations mentioned in the text are proprietary ones, without mention of the dosage of the actual active agent or even its non-proprietary name. There is, however, an index at the end of the book which gives the composition of the proprietary preparations mentioned. Even so, it is occasionally impossible to discover the formula of the drug. This means that practitioners on this continent might find difficulty in detecting drugs already well-known here under another name. The book is very up to date, even containing a section on the new oral anti-diabetic drugs.

SYNTHETIC DRUGS. H. Ronald Fleck. 380 pp. Illust. D. Van Nostrand Co., Princeton, N.J.; McClelland and Stewart, Toronto, 1955. \$12.50.

This is a treatise on the chemistry, synthesis and clinical application of drugs which are produced synthetically as opposed to those obtained from natural sources. It is elegantly printed and produced, and will have its main appeal, one would judge, to the chemist. From the point of view of pharmacology, this fragmentation of materia medica is a rather unnatural process, particularly since it can never be entirely consistent. This is illustrated by the inclusion of certain of the antibiotics and hormones in this volume: perhaps in later editions they will have become synthetic drugs. The physiological side of the story is very lightly dealt with. From a clinical point of view, one is apt to be confused by the nomenclature used, since proprietary and official names are used more or less indiscriminately, with nothing to indicate which are which. The confusion is further compounded by the differences in British and American official usage, and the usefulness of a book which does not clearly distinguish among them all is severely limited. Partly because of space limitations and partly because of the author's purposes in writing the book, there is very little in the way of therapeutic advice offered and this does not sound very authoritative.

The book is well indexed, but the number of references cited is small. It is a reference book, chiefly useful to those whose interest is in synthetic chemistry.

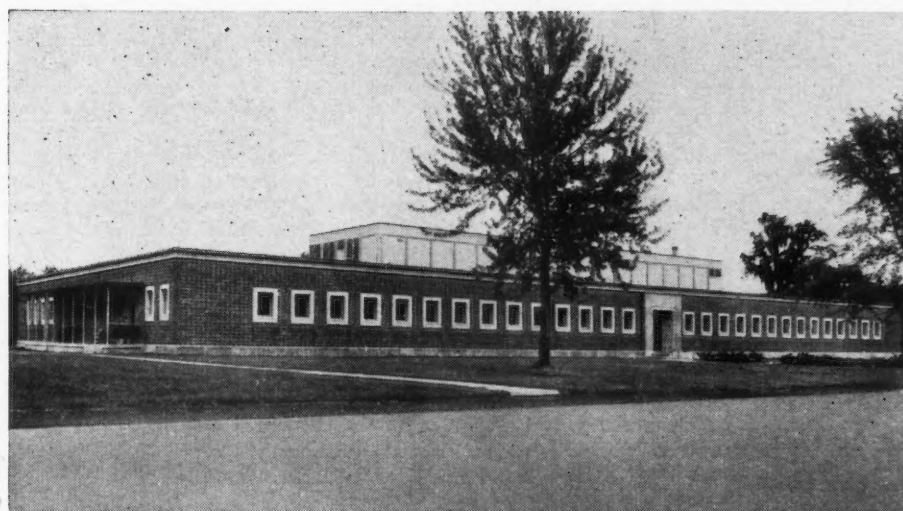
A DOCTOR'S MARITAL GUIDE FOR PATIENTS. B. R. Greenblat, Clinical Instructor, Obstetrics and Gynecology, University of the State of New York, School of Medicine, Brooklyn, N.Y. 88 pp. Illust. (2 editions, Regular and Catholic.) The Budlong Press, Chicago, Ill., 1956. \$1.50.

This little booklet is available in two editions, an ordinary one and a Catholic one. It is designed for distribution only through physicians and contains a fairly full discussion of the sexual side of marriage. The first part is an exposition of the anatomy and physiology of sex for the young adult. The later sections of the book contain an account of the physiological side of sexual activity, with a note on some anomalies and abnormalities, as well as an account of conception and pregnancy. The last chapter in the book differs in the two editions; in the non-Catholic edition some account of contraceptive practice is given, whereas in the Catholic edition the Catholic viewpoint appears to be stated fairly and adequately.

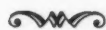
(Continued on page 466)

CONNAUGHT

POLIOMYELITIS VACCINE



A new building to house increased facilities for the production of poliomyelitis vaccine was opened at the Dufferin Division of the Connaught Medical Research Laboratories on June 22nd, 1956. The new building will provide quarters under one roof for processes which have been located temporarily in several parts of the Laboratories.



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OPERATIVE SURGERY OF THE DOG. Veterinary Bulletin Special Edition. J. M. Miller, Chief, Surgical Service, Veterans Administration Hospital, Fort Howard, Maryland, and Jeannette M. Whitehorn. 64 pp. Illust. Lederle Laboratories Division, American Cyanamid Company, Pearl River, N.Y., 1956.

The first course for medical students in the operative surgery of the dog was organized in 1895 by Halsted and Cushing at the Johns Hopkins University. The present volume describes the present-day status of this course for veterinary and medical students.

It begins with a chapter on preparation for the operative exercises, including sections on sutures, knot-tying and aseptic technique. This is followed by notes on anaesthesia and applied canine anatomy.

The second chapter leads the student progressively from repair of a simple wound through splenectomy and thyroidectomy, tendon repair and excision of various abdominal viscera up to lung surgery and cystotomy. The monograph is beautifully illustrated, and its source is a guarantee of its worth as a text.

ASCLEPIADES. His Life and Writing. R. M. Green, Emeritus Professor of Anatomy, Harvard Medical School, Boston, Mass. 167 pp. Elizabeth Licht, New Haven, Connecticut, 1955. \$6.00.

To the late Dr. Robert Montraville Green, at the time of his death Emeritus Professor of Anatomy, Harvard Medical School, we owe a number of useful translations, of which these are the last. Antonio Cocchi's *Life of Asclepiades* dates from the middle of the 18th century and Christian Gottlieb Gumpert's *Fragments* (also including a biography) from 1794. Neither has been easily accessible, for the original works are rare. Now both may be had in clear, precise translation. Both are admirable in scholarship, and for those interested in Graeco-Roman medicine, indispensable. But scholarship in this area did not cease at the end of the 18th century. Although *Des Asclepiades von Bithynien Gesundheitsvorschriften* of Ritter von Welz, published in 1841, was the last book on Asclepiades himself, much work has been done in our own time on the origins and nature of the methodist sect, on ancient atomic theory, on epicurean philosophy and on many other subjects from which it was quite impossible to exclude him. Caelius Aurelianus, one of the chief among ancient sources, has been translated and annotated. That all of this is ignored in the present volume may be occasion for regret that an opportunity was missed; it should not lessen our gratitude for what has been well accomplished.

Dr. Sidney Licht declares in his preface that Asclepiades, "as a founder of the methodist sect, summed up and transmitted the soundest traditions of his predecessors to the great Galen". This is manifestly incorrect. Asclepiades was a medical revolutionary, in theory and practice. Galen had little use for any of the sects, least of all for the methodists. Asclepiades was nevertheless a physician of undoubted importance, although his interest for modern doctors, unless their thoughts turn toward

ancient philosophy and medical theory as purely historical studies, will consist almost entirely in his well-developed physiotherapy.

THE OFFICE ASSISTANT IN MEDICAL OR DENTAL PRACTICE. Portia M. Frederick, Instructor, Medical Office Assisting, Long Beach City College, Cal., and Carol Towner, Executive Assistant, Department of Public Relations, American Medical Association, Chicago, Ill. 351 pp. Illust. W. B. Saunders Company, Philadelphia and London, 1956. \$4.75.

This 336-page manual provides useful training for the new office assistant or secretary, or it may serve as a refresher course. There are suggestions for establishing higher standards of office efficiency. The physician himself may find many hints in organizing his office routine. There are instructions to the office assistant in receiving patients, answering the telephone, and making appointments. Office records and bookkeeping systems are well illustrated. Assisting techniques in the preparation and handling of patients are outlined. The material is presented clearly and illustrations are adequate.

COLOR ATLAS OF ORAL PATHOLOGY. Prepared under the auspices of the U.S. Naval Dental School of the National Naval Medical Center, Bethesda, Md. 188 pp. Illust. J. B. Lippincott Company, Philadelphia and Montreal, 1956. \$12.00.

The first chapter is devoted to a brief outline of histology and embryology of the oral cavity. The other four chapters deal with developmental disturbances, diseases of the teeth and supporting structures, diseases of the oral mucosa and jaws, and neoplasms.

Illustrations are numerous and for the most part good. The colours, while not quite true, are good approximations of reality and the clinical pictures are particularly good. The text is sharply limited and the book suffers from the inherent difficulty of the consideration of systemic diseases from the purely oral aspect.

It should, however, prove a useful reference for dentists and physicians in the recognition of oral diseases.

PSYCHIATRIC RESEARCH REPORTS. Edited by J. S. Gottlieb and others. 176 pp. The American Psychiatric Association, Washington, D.C., 1955. \$2.00.

Psychiatric Research Reports No. 2 is a symposium of papers presented at a regional research conference of the American Psychiatric Association in Mexico City in collaboration with the Department of Psychiatry of the Graduate School, University of Mexico, March 11-13, 1954. The papers in this report cover a variety of topics under the general heading of Approaches to the Study of Personality. These papers might best be described as vignettes or sketches of the problems rather than actual reportings on research studies. General headings are Psychoanalytic Approach, Biochemical Approach, Cultural, Anthropological, Semantic, and Communications Approach, Systemic Approach, Cybernetic and Constitutional Approaches.

This is an interesting report of what undoubtedly was a stimulating gathering of those looking at problems of human personality from many points of view. One expects that the reports will be of most value to those who were fortunate enough to attend the conference.

DIE KOLPOSKOPIE IN DER PRAXIS (Colposcopy in Practice). H. Cramer, University Hospital for Women, Frankfurt am Main, Germany. 103 pp. Illust. Georg Thieme Company, Stuttgart; Intercontinental Medical Book Corporation, New York, 1956. \$1.15.

This little book is intended as an introduction to the early diagnosis of carcinoma of the cervix by colposcopy, i.e. examination of the cervix with the aid of a magnifying arrangement and a light source. Its great merit is the collection of colour photographs of various states of the cervix, taken with the aid of special photographic apparatus. There are some 40 excellent photographs depicting all types of lesions of the cervix and intended for the introduction of the occasional gynaecologist and general practitioner.

(Continued on page 468)

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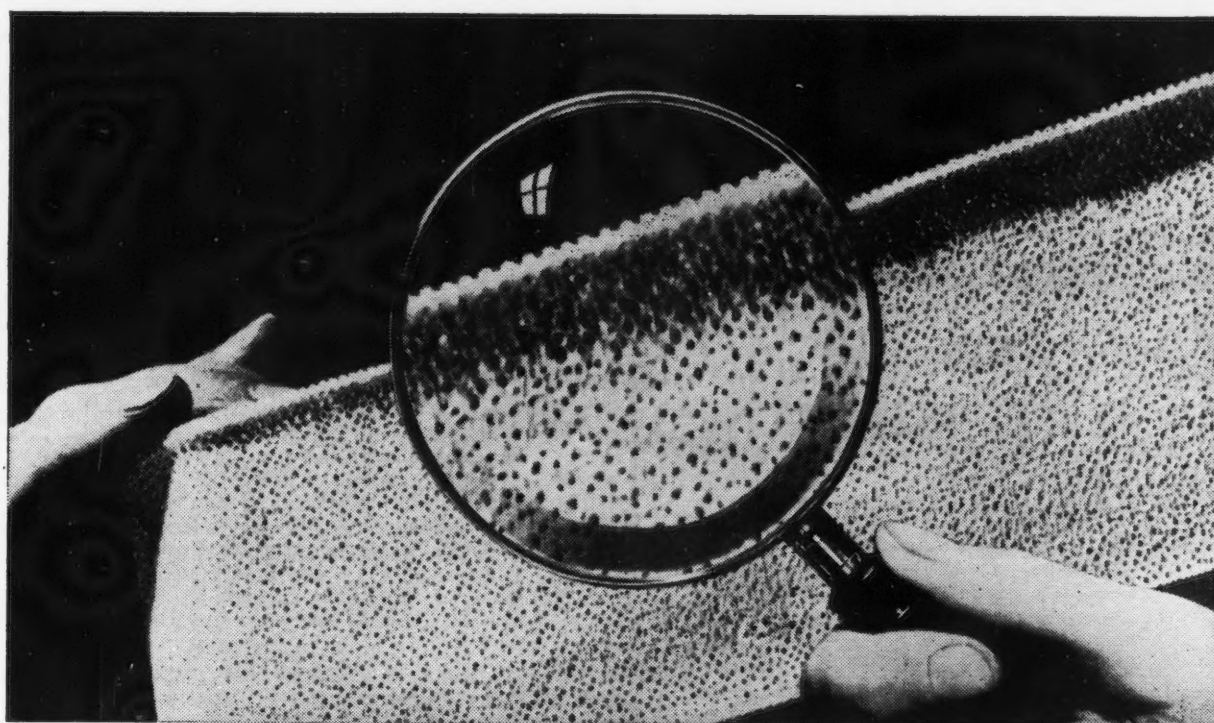
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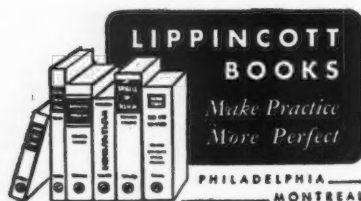
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DIE SCHUTZIMPFGUNG GEGEN POLIOMYELITIS (Poliomyelitis Vaccination). Behring Organization Communications, No. 31. 291 pp. Illust. N. G. Elwert, Publisher, Marburg am Lahn, Germany, 1956.

This monograph from the Behring Organization is No. 31 in a series of communications. It contains a great number of abstracts of articles on poliomyelitis vaccine from Germany and also from other countries in which the subject has been studied, together with reports of a series of European congresses and other meetings at which the question has been discussed. The physician who reads German will find within these pages a ready reference to the literature which he will not readily obtain elsewhere.

There is an interesting appendix to this volume in which abstracts of the writings of Dr. Paul Roemer in the years 1909-1913 are reviewed, with the object of showing how near Roemer had got to the concept of active immunization against poliomyelitis.

SYMPTOME UND DIAGNOSE DER HALS-NASEN-OHREN KRANKHEITEN (Symptoms, Signs and Diagnosis of Otorhinolaryngological Diseases). M. Schwarz, Tübingen, W. Germany. 351 pp. Illust. Georg Thieme Company, Stuttgart; Intercontinental Medical Book Corporation, New York, 1956. DM 48.-

This is a beautifully produced and well-executed text on differential diagnosis in otolaryngology, by the chief of the Otolaryngological Clinic in the University of Tübingen. It is based on a lecture course given by Professor Schwarz, and omits a description of the common methods of examination, although more complicated techniques are described. In order to save space, a bibliography is also omitted.

The book has a practical orientation, with emphasis on discussion of the more common signs and symptoms. Thus Schwarz considers in detail the differential diagnosis of aural discharge, pain in the ear, tinnitus, etc. Under nasal symptoms he considers changes in shape of the nose, difficulty in nasal respiration, nose-bleeds, running nose and eyelid swellings and displacements.

Neurological conditions are dealt with in so far as they come within the province of the otolaryngologist. There are thus special sections on various nerve palsies (V, VI, VII etc.).

CLINICAL STUDIES IN NEUROLOGY. H. L. Parker, Professor of Neurology, Mayo Foundation Graduate School, University of Minnesota, Rochester. 364 pp. Charles C Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1955. \$7.25.

This is a book to delight the heart of present medical students and of continuing students of medicine. It comes from the pen of a man who has taught students in Ireland and at the Mayo Clinic. The book consists of his morning demonstration rounds at one of the great Dublin hospitals. The author in these bedside lectures attempts to cover "many of the more common diseases of the nervous system and a few of the rare". The chapters are listed according to the month in which the bedside clinics were given so that October, the opening month in the British teaching year, covers eight subjects ranging from trigeminal neuralgia to multiple sclerosis and Parkinsonism. And so throughout the months of the teaching year up till June we find not lectures about disease but rather disease well described, with great imagination and with sympathy for the patients. The patients in the bed live again.

This book is written in English totally distinct from the tortured verbiage, not to say garbage, which tends to fill periodical medical literature, and which chokes our daily mail. If a student were to be presented with a book because he has done well, or to stimulate him to do better, no better choice could be made than this by Professor Parker. In a most original way he combines the best elements of good neurology with those of good teaching and the result is one of those friendly books, which, once read, one never forgets. In this Professor Parker has created a real student's friend, and the patients whose ills are chronicled here become the student's friends. It is to be hoped that this book has a very wide circulation.

MEDICAL NEWS in brief

(Continued from page 428)

MANUAL FOR CANCER REGISTRIES IN ONTARIO

The Ontario Cancer Treatment and Research Foundation has just released the first edition of its new "Manual on Records and Procedure for Cancer Registries in Ontario". This manual was prepared for the Foundation by the Division of Medical Statistics, Department of Health for Ontario, and is designed to serve as a guide for hospitals developing and operating cancer registries under the ægis of the Foundation.

The manual describes fully the purpose and the general procedure in the completion and use of the various forms involved in the registry system and includes reproductions of the Cancer Registry Abstract Sheet, the follow-up card and the two indexing cards used. While this first edition has been designated as "tentative", it is not anticipated that any major changes will be required.

LARYNGOLOGY COURSE

The next Laryngology and Bronchoesophagology course to be given by the University of Illinois, College of Medicine, is scheduled for November 5-17, 1956. The course is under the direction of Dr. Paul H. Holinger.

Interested registrants will please write directly to the Department of Otolaryngology, University of Illinois, College of Medicine, 1853 W. Polk Street, Chicago 12, Ill.

THE LIFE OF A POLYMORPH

Lissac and his colleagues from Paris (*Rev. franç. Etudes clin. et Biol.*, 1: 631, 1956) have studied the life of polynuclear leukocytes *in vivo* by using quinacrine as an indicator. They tagged leukocytes in animals and in man by rapid injection of quinacrine into a vein or bone marrow, and following the fate of the fluorescent polymorphs by ultraviolet investigation of blood smears and organ smears. They confirm that polymorphs do not remain in the blood stream all their

lives but pass part of their life span in vascular pools. The blood stream phase appears to last about 40 minutes and is interrupted by a hold-up in the lung for a few hours with a later sojourn in spleen and liver. The blood stream phase is prolonged in polymorph leukocytosis of infection, in leukæmias, and in leukopenia due to marrow aplasia. It is shortened in splenic neutropenia.

ARTIFICIAL KIDNEY

The artificial kidney, designed by the Swedish scientist Nils Alwall and series manufactured by Avesta Jernverk, is becoming an export commodity in great demand. The latest orders received include deliveries to Soviet Russia, Egypt, Mexico, West Germany and the Scandinavian countries. — *Swedish International Press.*

(Continued on page 50)

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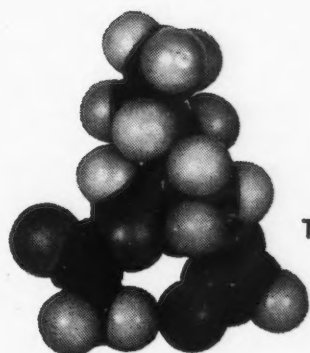
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MEDICAL NEWS in brief

(Continued from page 47)

MAJOR EXARTICULATIONS
FOR MALIGNANT
NEOPLASMS

The three major amputations—interscapulo-thoracic, hip-joint disarticulation and hemipelvectomy—are usually done as desperate measures for malignant neoplasms of limbs. Quite apart from the palliation achieved, they have a role in prolonging life.

Pack of New York (*J. Bone & Joint Surg.*, 38A: 249, 1956) reviews the end results in 228 cases, and finds a surprisingly high five-year cure rate. For interscapulo-thoracic amputation it is 33.3%, for hip-joint disarticulation 15.4% and for hemipelvectomy 21.4%. There were no operative deaths in the series. Nine patients are alive and well ten years after major amputation, and two have survived 20 years. Previous therapy by surgical dissection, irradiation or lesser amputation made the end result less favourable.

VARIATIONS IN
ALDOSTERONE SECRETION

Mach and Mach of Geneva (*Rev. franç. Etudes clin. et Biol.*, 1: 619, 1956) have used the chemical determination of aldosterone in the urine to study variations in aldosterone secretion in physiological and other conditions. They find that sharply reducing the intake of sodium leads to an immediate sharp rise in aldosterone secretion. Similarly an excess of potassium in the diet leads to an immediate rise in hormone excretion. The third cause of increased urinary aldosterone is fluid restriction. The reverse of the above three conditions leads to a diminution in aldosterone excretion.

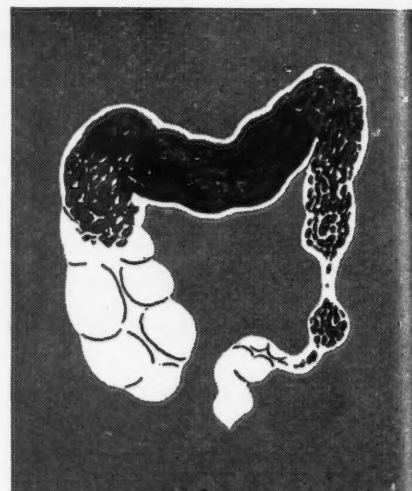
As regards pathological increased production of aldosterone, the authors distinguish between primary aldosteronism (which may present either as Conn's syndrome due to an adrenal tumour secreting aldosterone, or as the syndrome of sodium retention with oedema but without excessive potassium loss) and a secondary hyperaldosteronism observed in patients with a nephrotic syndrome, with cardiac failure or with liver cirrhosis and oedema.

REDEEMING "SKID ROW"

Myerson (*New England J. Med.*, 254: 1168, 1956) reports long-term observations on a group of alcoholic patients who had sunk to the lowest depths of "Skid Row". No longer capable of forming relationships with other persons, insatiable in their demands and incapable of giving, this group of 101 men were put on a long-term rehabilitation program at the Long Island Hospital, Boston. Four years after the beginning of this program the results were assessed. In 47 cases attempts at rehabilitation failed com-

pletely, but it must be remembered that this group had long since been given up by all other agencies as hopeless. In 54 cases an improvement in drinking habits had occurred, though only 12 men were completely successful in restoring themselves to their families and living independently from the hospital. Myerson points out that this type of rehabilitation program affects the whole community and must be carried out over a long period with adequate facilities for follow-up. Considering that on an average these 101 men had spent exactly a quarter of their time in

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gaols or other public institutions before rehabilitation, the effort would seem well worthwhile.

PERNICIOUS ANÆMIA DUE TO DIETARY DEFICIENCY

Pernicious anæmia due to dietary deficiency of vitamin B₁₂ alone must be a very rare condition. A case is recorded from Boston (*New England J. Med.*, 255: 164, 1956) in which a 60-year-old man, who had because of paranoid thoughts refused all food of animal origin for

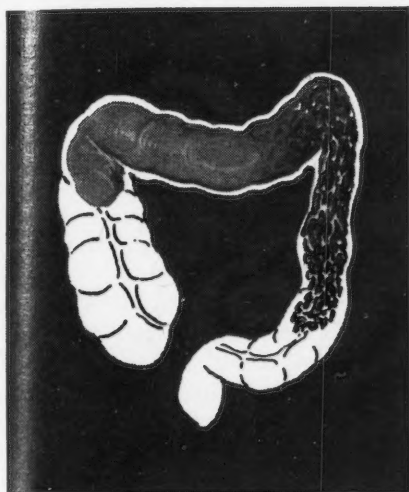
at least eight years, developed a pernicious anæmia. There was rapid response to multiple vitamin therapy together with vitamin B₁₂ and folic acid. His absorption of vitamin B₁₂ was shown to be normal, and the potency of intrinsic factor in his gastric juice was also found normal.

No similarly documented case is known to the authors, although malnutrition exists throughout the world in almost every conceivable form. Four factors make this condition rare. Firstly, 10-15% of the average dietary amount of vitamin B₁₂ is all that is needed to prevent

pernicious anæmia; to obtain a vitamin B₁₂ intake below this preventive level, the diet must exclude virtually all meat, fish, fowl, dairy products and unrefined grain. Secondly, these dietary deficiencies must exist in an unbalanced form. Thirdly, they must continue for at least two years. Fourthly, in the early stages of such an illness the patient would almost certainly receive multi-vitamin preparations at once.

CORTISONE FOR TREATMENT OF ASTHMATIC CHILDREN

Opinion is still divided on the question of cortisone treatment of asthma in adults. In an asthma clinic in the Midlands of England, a comparison was made of the effects of oral cortisone and placebo tablets on the ventilatory function of 12 children with chronic asthma. It is hard to assess changes in a patient with asthma from the symptoms alone, but studies of pulmonary function provided a useful objective measure of response to therapy. In the present trial the expiratory flow rate was taken as the measure. Because of the possible danger of producing adrenal cortical atrophy by long-continued cortisone administration, the course of treatment was limited to one hundred 25 mg. tablets over a period of five to six weeks. During cortisone the mean expiratory flow rate was 13% higher than during placebo therapy. It seemed that a minimum dose of 75 mg. cortisone daily was necessary for an effect. Children who responded well to aerosol adrenaline seemed more likely to respond to cortisone, and the combination of cortisone and adrenaline gave a greater result than the single effect of either drug alone in 11 out of 12 children. Use of cortisone should be confined to the most severe cases in children, if unequivocal evidence of improvement has resulted after a short course of treatment. It is questionable whether long-term therapy with small doses is any use, and whether long-term therapy with effective doses is justifiable.—*Brit. M. J.*, 1: 1513, 1956.



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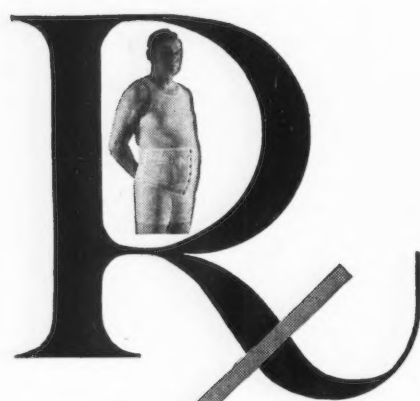


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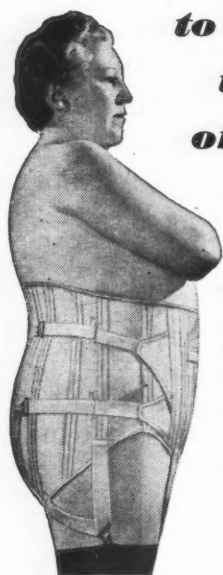
(Continued on page 52)



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MEDICAL NEWS in brief

(Continued from page 51)

THE UNUNITED CARPAL NAVICULAR FRACTURE

Many alternatives have been suggested for the treatment of the patient with a stiff painful wrist due to non-union of a carpal navicular fracture. Smith and Friedman (*J. Bone & Joint Surg.*, 38A: 368, 1956) believe that the pain may be in part due to impingement of the distal fragment on the styloid process of the radius and therefore recommend radial styloidectomy, which has given excellent results in 10 cases, a fair result in one and poor results in two. More radical procedures may be used if this simple operation fails.

AMERICAN PSYCHOSOMATIC SOCIETY

The American Psychosomatic Society will hold its Fourteenth Annual Meeting at Chalfonte-Haddon Hall in Atlantic City on Saturday and Sunday, May 4 and 5, 1957. The Program Committee would like to receive titles and abstracts of papers for consideration for the program not later than December 1, 1956. The time allotted for presentation of each paper will be 20 minutes. Abstracts, in sextuplicate, should be submitted for the Program Committee's consideration to the Chairman, Dr. I. A. Mirsky, at 551 Madison Avenue, New York 22, N.Y.

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY

Applications for certification for the 1957 Part I Examinations are now being accepted. Candidates making new application, or requesting the reopening of an application, must do so before October 1, 1956. Applications are to be accompanied by a list of hospital admissions as outlined in the current Bulletin of the Board.

The next scheduled examination (Part I), written and review of case histories, for all candidates will be held in various cities of the United States, Canada, and military centres outside the Continental United States, on Friday, February 1, 1957. Current Bulletins are now

available and may be obtained by writing to: Robert L. Faulkner, M.D., Secretary, American Board of Obstetrics and Gynecology, 2105 Adelbert Road, Cleveland 6, Ohio.

NATIONAL IMMUNIZATION WEEK

Material has been received from the Health League of Canada, Toronto, on the observance of National Immunization Week, which this year will cover September 23-29. During this week the Health League of Canada, in conjunction with departments of health throughout Canada, will attempt to bring before all citizens of Canada educational material showing why immunization of children against infectious diseases is necessary. This will be the fourteenth annual National Immunization Week.

MULTIPLE SCLEROSIS ABSTRACTS

The National Multiple Sclerosis Society of the U.S.A. has made an initial grant of \$15,000 to Excerpta Medica Foundation of Holland, which will excerpt from all current scientific and medical journals, foreign as well as American, literature on demyelinating diseases. The abstracts will be published in a monthly journal containing 100 to 150 abstracts.

PASTEURELLA AND CAT BITES

We recently drew attention in this Journal (75: 218, 1956) to a case of *Pasteurella multocida* infection from a cat bite. Byrne and his colleagues from Boston, Massachusetts, record three recent cases of *Pasteurella multocida* infection following cat bites, pointing out the common occurrence of osteomyelitis as a complication of this, possibly due to the long, sharp, needle-like nature of cat fangs. They advise treating cat bites first with a thorough soap and water scrub followed by a saline irrigation and sterile dressing. Prophylactic tetanus antitoxin or toxoid should be given and procaine penicillin (600,000 units) should be administered daily for four days. In wounds seen at a later stage, the

(Continued on page 54)



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MEDICAL NEWS in brief

(Continued from page 52)

patient should be admitted to hospital and radiographs taken to detect early osteomyelitis. Cultures from the wound should be taken with special note of the possibility of finding *Pasteurella multocida*. Most cases respond to penicillin. An area of osteomyelitis should be surgically incised.—*Surg., Gynec. & Obst.*, 103: 57, 1956.

TREATMENT OF BILIARY INFECTION WITH A PENICILLIN-STREPTOMYCIN COMBINATION

In Essen, Germany (*Deutsche med. Wchnschr.*, 81: 1055, 1956), a preparation known as ET2, containing in each ampoule 210 mg. (250,000 i.u.) of penicillin choline ester and 1 g. of a 20% dihydrostreptomycin pantothenate, has

been used in the treatment of biliary infections. These particular preparations of penicillin and streptomycin were chosen because experiments had shown that the choline ester of penicillin had a particular affinity for the biliary system. The high level of excretion of penicillin and streptomycin in the bile was confirmed by giving a series of patients one ampoule of ET2 before operation and determining the penicillin and streptomycin content of the bile immediately after cholecystectomy. In three cases the determinations were also made via a drainage tube after cholecystectomy.

In 81 cases of cholecystectomy, there were no infective complications with ET2 medication. In addition 22 cases of acute or chronic recurrent cholangitis were treated with ET2 in a dosage of two to three ampoules a day for five to 12 days. In 17 of these 22 cases the clinical condition was cured. The cultures of duodenal contents were bacteria-free. One of the remaining five patients was rendered free from bacteria by further treatment by tetracycline. The results are considered good in comparison with those given by broad-spectrum antibiotics. Tolerance was good. The authors warn against intravenous injection, since the choline ester has a curariform effect.

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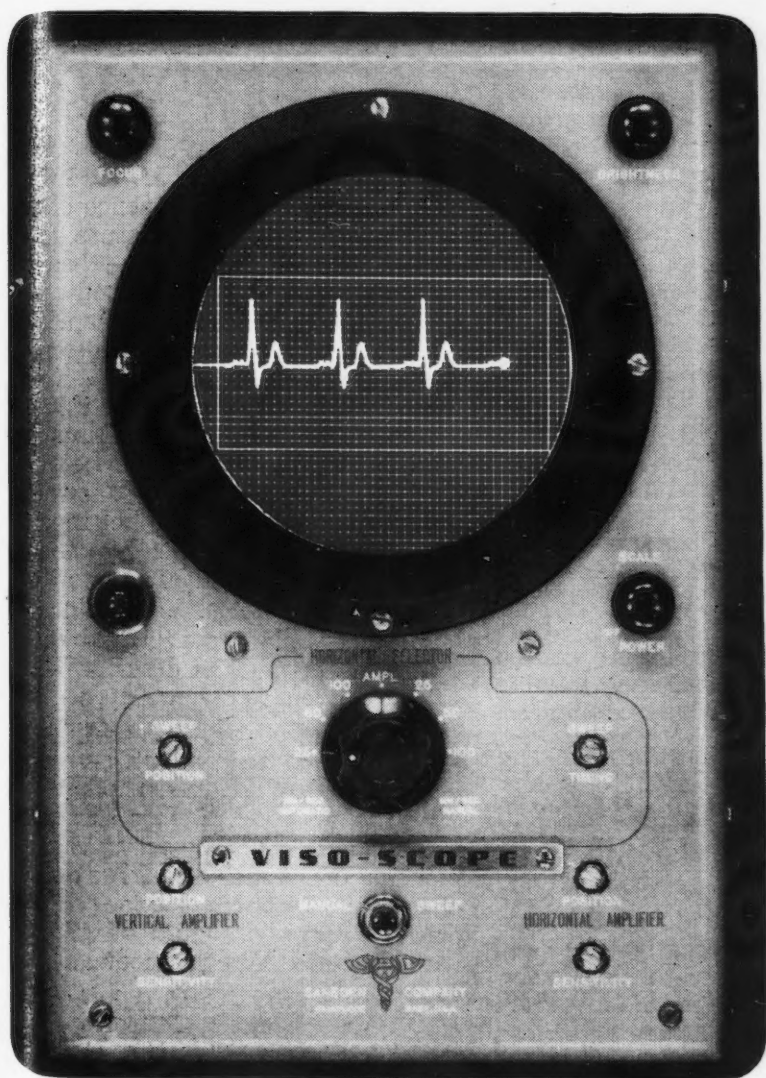
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Danbury Connecticut, U.S.A.*It's Sharp*TRENDS IN U.S.
MEDICAL PRACTICE

The latest of a series of reports on trends in medical practice, as shown by an analysis of the distribution and characteristics of employment of 1915-45 medical college graduates in the U.S.A., has been published as a supplement to the *Journal of Medical Education* (July 1956, vol. 31). The authors, Weiskotten and Altenderfer, show with a liberal use of tables that very few graduates of U.S. medical schools practise outside the United States, and that the differences in distribution of medical graduates and of total populations among the states are not great. They note the increasing tendency for graduates to locate in smaller communities and they also note that those young men and women who come from smaller communities tend to go back there to practise. The homing tendency of the U.S. medical grad-

(Continued on page 56)

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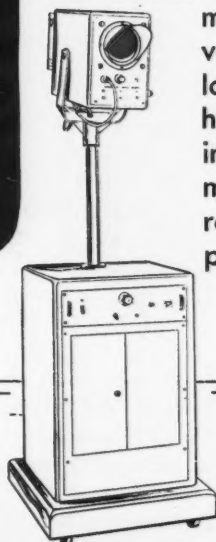
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PEDIATRIC

MEDICAL NEWS in brief (Continued from page 54)

uate is shown by the fact that three out of ten tend to practise in their home towns, and an additional three out of ten remain in their home states. The authors note that publicly supported medical schools draw a higher proportion of their students from the smaller communities and contribute comparatively more physicians to these communities than do private medical schools. The proportion of specialists is increasing; it has now reached 74% of 1945 graduates. Furthermore, an increasing number of specialists are locating in smaller communities. The greatest change in the method of practice since the last report is the fall in the proportion of graduates engaged in individual practice. The growth of full-time salaried physicians is also a feature of this new analysis. Such positions are now held by a little over one-quarter of the 1945 graduates in practice, the highest proportion among classes studied.

Almost all medical college graduates now do an internship, but there has been little change in the proportion of general practitioners taking residency training—from 30-35% of the graduates studied have done so. Residency training for specialties is, however, increasingly popular.

NAMING NEW VIRUSES

In a letter to *Science* (124: 119, 1956), a group of distinguished virus investigators discuss the nomenclature of the recently discovered respiratory-tract viruses. At a meeting in New York City in May, these investigators and others agreed on the use of the term "adenovirus" group for these, since the term suggests a characteristic involvement of lymphadenoid tissue, refers also to the tissue (adenoids) from which the viruses were originally recovered, and is in accordance with proposals for nomenclature of these micro-organisms. The writers of the letter refer briefly to the characteristics of adenoviruses. These produce acute infection of respiratory and ocular mucous membranes, with associated follicular enlargement of the submucous lymphadenoid tissue in these areas and also of regional lymph nodes. They multiply readily in tissue culture of certain types of human and simian cells. Members

of the family share an antigen unique to the group. Illness has not yet been produced by the group in common laboratory animals.

Although these investigators point out that they have no mandate for forcing their new suggestions on the world, they are the persons most concerned in the problems in virology, and they hope that the suggestion will be adopted.

ANÆSTHESIA FOR PATIENTS GIVEN RAUWOLFIA THERAPY

Coakley *et al.* (*J. A. M. A.*, 161: 1143, 1956) note the incidence of a serious fall in blood pressure together with slowing of the heart rate in 16 out of 40 unselected patients who were given an anæsthetic and who had a recent history of having taken rauwolfia for hypertension. The blood pressure dropped by more than 40 mm. Hg, and the pulse rate fell below 60. ECG tracings also showed ischæmic myocardial changes during anæsthesia. This hypotension did not respond satisfactorily to vasopressor drugs. Vagal blocking drugs, such as oxyphenonium (Antrenyl) bromide in doses of 0.5-1.0 mg., given intravenously, were satisfactory.

It is advised that patients on rauwolfia therapy be taken off the drug for two weeks before surgery if possible. In emergency, vagal blocking drugs such as a large dose of atropine or scopolamine or a dose of Antrenyl should be given with the anæsthetic premedication.

CIBA FOUNDATION AWARDS

A panel consisting of Prof. C. H. Best (Toronto), Prof. E. Braun-Menendez (Buenos Aires), Dr. G. W. Corner (New York), Prof. A. Haddow (London), Prof. R. Nicolaysen (Oslo), Dr. A. S. Parkes (London), Prof. F. Verzar (Basle), and Prof. F. G. Young (Cambridge), with Prof. E. J. Conway (Dublin) and Prof. V. R. Khanolkar (Bombay) as corresponding members, has considered 75 papers from 17 countries for the *Ciba Foundation's Awards for 1956 for research relevant to the problems of aging*, and the following Awards have been

(Continued on page 58)



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MEDICAL NEWS in brief

(Continued from page 56)

made (the names of leading authors only are given): Dr. Madeline Keech and Dr. R. Reed (jointly), University of Leeds: "Connective tissue and the aging process" (£400). Dr. B. Bronte-Stewart, University of Cape Town: "A concept of the etiology and pathogenesis of coronary heart disease resulting from inter-racial studies in South Africa" (£300). Mr. R. L. Gregory, University of Cambridge: "Increase in 'neurological noise' as a factor in sensory impairment associated with aging" (£300). Dr. J. Conway, Charing Cross Hospital, London: "The development of a clinical method of studying the process of aging in the large arteries" (£200).

Although not granted full awards, two from the U.S.A., two from Germany and one from Sweden were awarded £100.

The awards are being offered again in 1957, the closing date for entries being January 31, 1957. Further information may be obtained from the Ciba Foundation, 41 Portland Place, London, W.1.

COURSE IN
CHEST DISEASE

The University of Buffalo School of Medicine announces a short course entitled "Recent Advances in Chest Disease" designed for internists and general practitioners and taking place on September 19 and 20, 1956. The fee for the course is \$30. Further information may be obtained from Milton Terris, M.D., Assistant Dean for Postgraduate Education, University of Buffalo School of Medicine, 3435 Main Street, Buffalo 14, New York.

CANCER OF THE
THYROID GLAND

Ross of Los Angeles (*Surg., Gynec. & Obst.*, 103: 171, 1956) discusses treatment of cancer of the thyroid gland on the basis of his own series of 40 cases of proved cancer treated by surgery. He deplores the persistent tendency to minimize the malignancy of this tumour and to curtail the scope of surgery. In his opinion, all cancers of the thyroid gland should be treated by thyroidectomy together with block dissection of the lymph nodes in the neck, for 50% to 70%

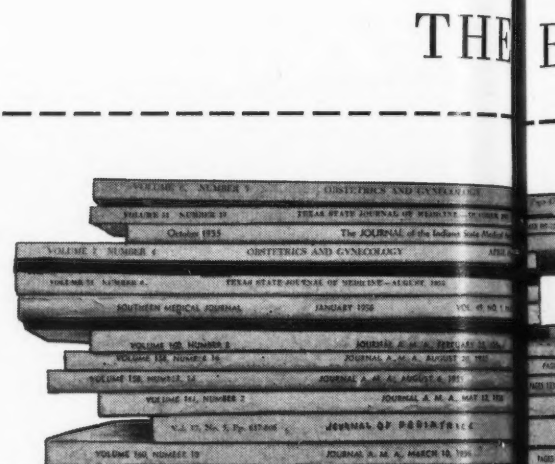
of patients have metastases in these when first seen. Thyroid cancer occurs at all ages, and seven tumours in the present series were in children. Patients may have thyrotoxicosis together with cancer. Seven of the 40 patients operated on are dead, 15 have survived for under five years, 12 are still alive after more than five years and six are still alive after more than ten years. Radioactive iodine studies are most useful preoperatively, and

the preparation of thyrograms is recommended. Radioactive iodine should be used to ablate any remaining thyroid tissue in the neck. Follow-up of all cases by radioactive iodine studies is indicated.

TREATMENT OF
EXTREMELY SEVERE
TETANUS

Three French authors (*Presse méd.*, 64: 1309, 1956) report the

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successful treatment of two cases of extremely severe tetanus by continuous perfusion of gallamine (Flaxedil) together with a neuroplegic mixture. In the two cases a generalized tetanus had developed within 48 hours after an incubation period of 10 to 12 days. The infective focus was excised, and serum and antitoxin were given, as were antibiotics. When major convulsions began, an intravenous infusion of gallamine in glucose-saline together

with magnesium sulphate 15% was begun and maintained night and day for 15 days. To the infusion was then added the so-called lytic cocktail containing chlorpromazine, promethazine and meperidine (Demerol). Approximately 180 mg. of gallamine was given each 24 hours. In each case, the patient took a marked turn for the better on the ninth day of treatment. In one case, giving hydrocortisone did not appear to affect the outcome.

SARCOID-LIKE LESIONS IN LYMPH NODES DRAINING CARCINOMA

Dr. ten Seldam of Sydney describes lesions resembling those of sarcoidosis in lymph nodes draining carcinomata (*M.J. Australia*, 1: 916, 1956). This is not the first time that this association has been described, for in 1950 various authors described some eleven cases. Ten Seldam has observed these lesions in lymph nodes from several cases of breast cancer. He suggests that the finding of a sarcoid lesion in a lymph node obtained by scalene biopsy should lead to a search for intrathoracic cancer.

MYOCARDIAL INFARCTION IN THE AGED

Rodstein has investigated the characteristics of nonfatal myocardial infarction in patients over 60 in a home for the aged in New York (*A.M.A. Arch. Int. Med.*, 98: 84, 1956). He draws attention to the high incidence of cases without pain or any other symptoms referable to myocardial infarction. Routine electrocardiographic examination of aged persons will uncover in an appreciable number changes of major degree compatible with myocardial infarction unsuspected clinically. Elderly persons with unexplained behaviour changes, sudden signs of cerebral insufficiency, or unexplained abdominal complaints, or with an abrupt fall in blood pressure should be suspected of having an acute myocardial infarction and be examined electrocardiographically.

PULHEMS SYSTEM IN CIVILIAN PRACTICE

Warren (*Brit. J. Indust. Med.*, 13: 202, 1956) describes an attempt to use the Pulhems system (originating in Canada and brought into use in the British Army in 1948) for the classification of persons in civilian employment. After a study of the classification of 1,000 persons in 73 different occupations he concludes that the Pulhems system is unsuitable. It provides too fine a screen for minor defects and too coarse a one for major defects. The difficulty is of course that the armed services are not interested in persons with major defects, whereas civilian

(Continued on page 60)

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MEDICAL NEWS in brief

(Continued from page 59)

employers are. Warren concludes that the Pulhems system cannot usefully be applied to civilian employees and it would be extremely difficult to modify it for widely differing industries and occupations. It is, however, valuable for collecting statistical information about the incidence of defects at medical examinations.

BRITISH MEDICAL ASSOCIATION PRIZES

The British Medical Association announces three prizes for the coming year.

The Katherine Bishop Harman Prize will be awarded in 1957, value £75. The purpose of the prize is "the encouragement of study and research directed to the diminution and avoidance of the risks to health and life that are apt to arise in pregnancy and childbearing." Any medical practitioner in the British Commonwealth is eligible to compete. Preliminary notice of entry is required, and information can be obtained from the Secretary, British Medical Association House, Tavistock Square, London, W.C.1.

The British Medical Association also announces the Sir Charles Hastings Clinical Prize Competition for 1957, together with a second award known as the Charles Oliver Hawthorne Clinical Prize. Prizes are given to members of the British Medical Association engaged in general practice, awards being based on personal observations and experiences collected by the candidate in general practice. Preliminary notice of entry is required, on a form of application to be obtained from the Secretary, British Medical Association House, Tavistock Square, London, W.C.1.

MOBILE TB CLINICS

In a recent issue of the *NAPT Bulletin*, Dr. Hoffstaedt discusses mobile clinics in undeveloped countries. The difficulty in the past has been the absence of road facilities, and the difficulty of preparing large landing strips for aircraft. Dr. Hoffstaedt suggests that this difficulty has now been solved with the arrival of a new type of relatively small but efficient aircraft, the Twin Pioneer, which will land on a piece of ground no bigger than

a football field. It has a cruising range of 500 miles and a top speed of 180 miles per hour. A crew of four and a payload of well over 3,000 lb. can be taken. For tuberculosis diagnosis, a portable x-ray unit can be carried together with electric generator and transformer. Apparatus for therapy and for health education can also be carried. The direct operating costs of the machine should average about 35 cents a mile. For those interested, technical details are available from Cooper Johnson, Ltd., 54 Lower Sloane Street, London, S.W. 1.

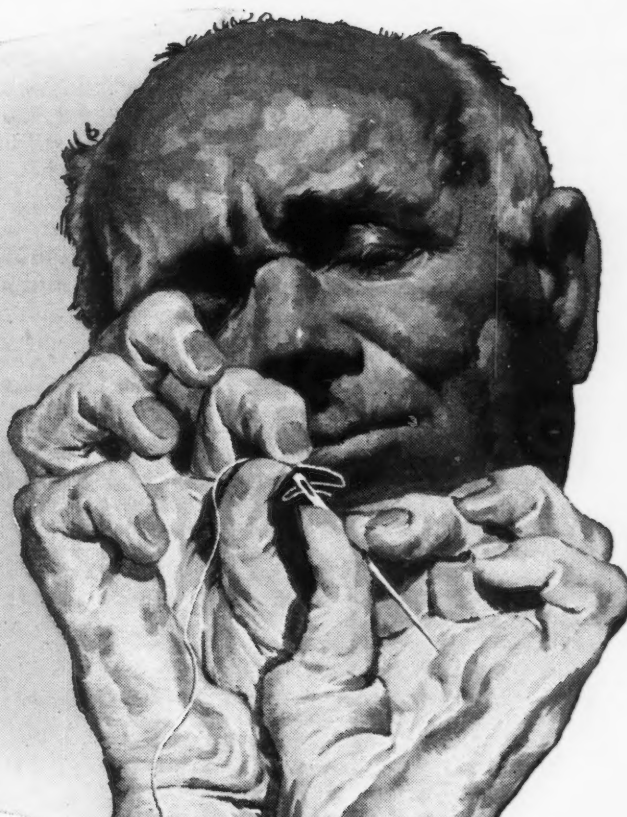
THE USE OF BIOFLAVONOID COMPOUNDS IN ERYTHROBLASTOSIS FETALIS

Jacobs of Houston, Texas (*Surg., Gynec. & Obst.*, 103: 233, 1956), has begun the use of bioflavonoid compounds as an adjunct to the prophylaxis of erythroblastosis fetalis. His reason for using these drugs is that they may affect three factors concerned in erythroblastosis: (1) by prevention or reduction of capillary fragility of the placenta, thus making transfer of fetal cells across the placental barrier more difficult; (2) by an antihistamine reaction; (3) by reduction or prevention of capillary fragility in the baby. Jacobs treated 12 previously Rh-immunized mothers with CVP, a proprietary bioflavonoid compound, during the course of a pregnancy. Six were discarded from the series, either because the baby proved to be Rh-negative or because the previous history of immunization was doubtful. The patients were given six capsules daily, i.e. 600 mg. of bioflavonoid, and therapy was started before the 14th week of pregnancy.

Of the remaining six cases in the study, three had dramatic results. These patients who had had erythroblastotic infants previously had no rise in antibody titre throughout pregnancy, and the babies were completely unaffected. In the other three cases, a baseline titre present early in pregnancy rose only slightly. The outcome was again good, although these infants were given exchange transfusion as well. Similar studies with larger series of cases are imperative.

(Continued on page 62)

Case History:
M. S., fifty-five, tailor.



**"...THE NEEDLE JUST
FELL OUT OF MY HAND..."**

M. S., fifty-five years old, was a tailor by trade. He had no suspicion of what was happening to him.

For months he had been conscious of slight swellings in the joints of his hands, but had dismissed them as he dismissed the other signposts—the inability to make a tight fist, growing difficulty when sewing buttonholes. Then one day, four years ago:

"I was sewing a buttonhole, and it was even harder than usual. And then, the needle just fell out of my hand . . ."

A tailor who cannot hold a needle is not a tailor any more. M. S. went to a doctor.

DIAGNOSIS: rapidly progressive rheumatoid arthritis.

For a year and a half M. S. was given Cortisone daily. The initial satisfactory results dwindled to ineffectiveness. Eventually hospitalized for "Cortison addiction", he was discharged with his joint condition improved but with his hands still swollen. His fingers would not flex. The only trade he knew seemed barred to him forever.

METICORTEN therapy was begun.

Four days later, on a 20 mg. daily dosage, he could make a fair fist. After a month he was able to leave for a prolonged rest on a daily maintenance dosage of 10 mg.

M. S. is now a tailor again. His needle-dropping average is "zero".

METICORTEN



Schering

MEDICAL NEWS in brief

(Continued from page 60)

TREATMENT OF URINARY
INFECTION WITH
FURADANTIN

Voorspuij and Haex of Leiden, Holland (*Nederl. tijdschr. geneesk.*, 100: 1961, 1956), report treatment of urinary infections with Furadantin (nitrofurantoin). Their work relates to 164 patients with urinary infections; in 63% of cases *E. coli* and coliform bacteria were present, in 21% *Strep. faecalis* was present, in 7% *Proteus*, in 2% *Pseudomonas*. The coli group were sensitive to

Furadantin on an average in concentrations of 2 mg. per 100 c.c., as also were enterococci, while *Proteus* was sensitive at 6 mg. per 100 c.c. *Pseudomonas pyocyanea* was apparently insensitive to the drug. Furadantin in doses of 7-8 mg. per kilogram bodyweight per 24 hours for five to seven days produced a sterile urine in three-quarters of the 89 cases studied. In some cases Furadantin gave results where sulfonamides had failed. The authors prefer Furadantin to sulfonamides on the following grounds: (1) the antibacterial spectrum of Furadantin

is broader; (2) complications of Furadantin treatment are apparently not likely to occur, possibly because of the lower dosage.

SPECIAL ISSUE OF
GENETICS JOURNAL

The *Acta Geneticae Medicae et Gemellologiae* has produced a special supplement in honour of the 60th birthday of Dr. Otmar Freiherr von Verschuer, the well-known medical geneticist. In this issue Gedda discusses fertility in relation to problems of congenital malformation, Grebe discusses familial findings in lethal cardiac malformations, and Hanhart analyzes the cases of Niemann-Pick disease in Switzerland, concluding that this disorder like Tay-Sachs disease is transmitted by simple recessive inheritance. Among other contributions, Koch analyzes the clinical features, pathogenesis and genetics of the Klippel-Trénaunay syndrome characterized by the triad of partial gigantism, naevi and varicose vein formation. He shows that the theories suggesting an exogenous origin of this malformation do not give a satisfactory explanation of the facts.

INDIAN JOURNAL OF
DERMATOLOGY

A new *Indian Journal of Dermatology* published in Calcutta appeared early this year. In the issue now to hand, the editor emphasizes the need to separate dermatology from the venereal diseases. The present journal, which must be distinguished from the *Indian Journal of Dermatology and Venereology* published in Bombay, is devoted entirely to skin disorders. In this issue the value of isoniazid in leprosy is reviewed, with the conclusion that when administered alone isoniazid is of definite value during the first eight to 12 weeks, but success is not maintained. Combined therapy with DDS is more effective. There is an article on keratosis follicularis; after investigation of 103 cases of this condition it is concluded that keratosis follicularis is due to combined deficiency of vitamin A and vitamin C. There are a number of other case reports, and very brief abstracts. The journal will appear quarterly and is published from 78 Dharamtala Street, Calcutta 13, India.

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